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MARTIN (J. P.). **Fiji disease of Sugar-Cane.**—*Hawaii. Plant. Rec.*, li, 2, pp. 103–118, 11 figs., 1947.

In this most interesting account of the history, symptoms, transmission, economic importance, and control of sugar-cane Fiji disease [*R.A.M.*, xxvii, p. 95; and next], the author states that the condition was first observed in Fiji about 40 years ago. By 1908–9 incidence had become so great that the entire sugar industry in Fiji was facing ruin. The distribution of the disease [ibid., xxii, p. 48] now extends to the Solomon Islands, New Britain, and Samoa. It is regarded as the most serious of the sugar-cane diseases and has caused greater financial loss than any other. In some cases losses of 90 per cent. have been recorded.

On very susceptible varieties the disease causes severe stunting and kills a large part of the cane outright. On more tolerant ones growth is much retarded; whereas healthy cane yields 70 to 80 tons per acre, diseased cane of the same variety may produce only 7 to 10 tons, according to the amount of infection present. Resistant varieties often show leaf galls without much stunting, and the potential danger is even greater than when susceptible varieties are attacked, because the infection may escape notice, and they are acting all the time as carriers.

In carrying out varietal resistance tests [ibid., xxvi, p. 263] it is indispensable to have a large population of the insect vector (*Perkinsiella vitiensis* in Fiji and Samoa), as well as a high incidence of the disease. One satisfactory method is to plant every third row with diseased cuttings of a susceptible variety, and the rows in between with the varieties under test. As severity increases with the ratoons, the test must be carried through at least one ratoon crop [but see loc. cit.].

Trials in Queensland with six promising Hawaiian canes showed that all were highly susceptible [ibid., xxiv, p. 206]. As the Australian vector, *P. saccharicida*, occurs in Hawaii, where, however, it has been controlled by means of parasites, it is clear that if one infective leafhopper should arrive by plane from Samoa, Fiji, or the Philippines and begin to feed on a cane, Fiji disease might well become established in Hawaii. Once the virus became established, the leafhoppers already present would spread it. With airfields now bordering plantations, a disease carried by an insect has a much better opportunity of spreading. The faster and more frequent trans-Pacific air service between Hawaii and countries where foreign diseases occur presents a major problem to the Hawaiian sugar industry. Quarantine measures are therefore more important than ever.

A list compiled by A. F. Bell of sugar-cane varieties and their relative degree of resistance to Fiji disease is given.

MARTIN (J. P.). **Observations on the sugar industry in Fiji—1947.**—*Hawaii. Plant. Rec.*, li, 2, pp. 119–136, 22 figs., 1947.

In this review of sugar-cane cultivation in Fiji the author states that Fiji disease [see preceding abstract] is locally the greatest limiting factor in sugar production. Since 1907 very definite field control has been practised. But for this the financial losses sustained would have brought the industry to an end. When new fields are

to be planted, the fields of cuttings are carefully inspected. If too many cases of Fiji disease are discovered in a given field, another is selected. It is of cardinal importance that all planting material should be taken from healthy plants. The supervisors and cutters are trained to recognize the symptoms. Shortly after the cane in plant fields has started to grow the fields are inspected periodically and all affected stools are rogued and burned. Roguing continues until the cane has closed in, and every effort is made to cover each field four or five times. The number of diseased stools rogued in each field is recorded, and the records are used to ascertain rate of spread and determine whether the cane in any particular field can be used at a future date as a source of planting material. There are always many more cases in the ratoons than in the plant cane, and in the past the disease has prevented the growing of more than one ratoon crop.

The disease is much more severe in the more fertile lands, especially near rivers, than in the less fertile, where growth is slower. In 1934 Badila, which is listed as very resistant, became so severely affected in rich river lands that whole fields had to be ploughed out. In 1929 at Rarawai and in 1930 at Lautoka H109 showed 90 per cent. infection. All attempts to control the disease on this variety by spraying failed. At Lambasa on Vanua Levu, where Fiji disease has never been a serious factor, H109 has given excellent sugar yields. To-day, it occupies 55 per cent. of the area given up to cane at Lambasa, though on the other estates on Viti Levu it could not be grown commercially because of its susceptibility. Pompey is highly resistant and Argus and Galba resistant.

Between 1936 and 1938 downy mildew [*Sclerospora sacchari*: *R.A.M.*, xxvii, p. 9] became very serious on POJ 2878 on the Rarawai and Lautoka estates. In many fields 20 per cent. of the cane was affected, and in some 90 per cent. In several localities this variety had to be replaced by resistant varieties. At Nausori the disease attacked Argus, which is listed as somewhat susceptible. Cases were found in which maize was being grown in close proximity to sugar-cane, and even between the rows. At Lautoka, for example, Ajax sugar-cane was affected and the disease was found on maize only 25 ft. away. The presence of maize in or near a sugar-cane field causes the disease to spread very rapidly.

Over a period of years downy mildew has been responsible for severe losses in Fiji, where it is regarded as second only to Fiji disease in economic importance. The control measures adopted are as follows. Very susceptible varieties are not planted in localities where the disease occurs every year. If a field becomes severely affected, it is burned before harvesting. All fields are periodically examined and the diseased plants rogued and burned. The planting of maize in or near fields is discouraged. Badila is very resistant and Pompey, H109, and Malabar (Yellow Caledonia) are resistant.

Chlorotic streak is present in low-lying and poorly drained areas and has caused some losses. At Rarawai it was observed on the Trojan variety, a very promising commercial cane. It was also found on Argus at Nausori, on which it was causing considerable damage in one localized area. By using only healthy planting material, incidence has so far been kept down to a minimum.

Some eye spot [*Helminthosporium sacchari*] was present at Nausori. The disease has occasionally caused serious losses on a few varieties.

Forbes (L.). **Future of the variety Co. 290 in Louisiana.**—*Sug. Bull.*, *N.O.*, xxv, 17, p. 129, 1947. [Abs. in *Sugar*, xlii, 10, p. 53, 1947.]

The sugar-cane variety Co. 290 is stated to have largely lost its value in Louisiana on account of its great susceptibility to diseases, chiefly red rot [*Physalospora tucumanensis*: *R.A.M.*, xxvi, p. 30] and mosaic [sugar-cane mosaic virus: ibid., xxv, p. 81]. On its first introduction into the State Co. 290 was little affected by these two pathogens, long endemic in the region, but red rot, in particular, has

acquired an increasingly virulent character. As regards mosaic, several new strains of the virus have appeared, some more destructive than others. With some effort on the part of planters, however, this disease can be combated by the selection of healthy planting material grown, where practicable, on special plots, or in any case on those from which all diseased material has been removed. The control of red rot is more troublesome owing to the decay of the pieces of seed cane in the ground, notably in mixed and heavy soils, but this difficulty may be partially surmounted by timely planting (September and early October) in good soil, where a stand will rapidly develop capable of surviving the winter even if the seed piece rots.

Cross (W. E.). **The Sugar Cane smut crisis in Tucumán.**—*Sugar*, xlii, 10, pp. 30–31, 1 fig., 1947.

A tabulated account is given of the campaign instituted by the Tucuman (Argentina) Agricultural Experiment Station to overcome the industrial crisis arising from the appearance in the Province in December, 1943, of sugar-cane smut [*Ustilago scitaminea*], through the development of resistant varieties. Thanks to the energetic measures adopted, the peril threatening the principal source of local wealth has been averted, and in fact, the amount of sugar produced in 1946 by the varieties authorized for cultivation by the Station far exceeded that obtained in Tucuman in any previous year.

Findlay (W. P. K.). **The use of perforated cards for preliminary identification of fungi.**—*Trans. Brit. mycol. Soc.*, xxxi, 1–2, pp. 106–111, 2 figs., 1947.

In order to effect the rapid preliminary identification of Hymenomycetes belonging to Polyporaceae and Agaricaceae, a system using cards with marginal perforations (patented by Copeland Chatterton & Co., London) has been devised. The most useful diagnostic features are entered on each card or on a master card, each corresponding to a numbered hole, and the edges of the holes are clipped out beside the numbers assigned to the particular features possessed by the species in question. The order in which the cards are arranged is immaterial but they must all be the right way up and facing the same way. When a specimen requires identification a knitting-needle is run through the hole beside the number corresponding to its most obvious diagnostic feature. Upon shaking the pack all the cards for species possessing this feature fall out, and from these the cards of species bearing a second well-marked diagnostic feature are isolated. Final diagnosis is assisted by the addition to the cards of notes on features not included in the standard characters assigned to the perforations. Special emphasis is placed on the choosing of well-defined, constant characters on which to base the key.

The advantages of this system over the dichotomous key are enumerated and the construction and use of card keys described with the aid of a text-figure showing a specimen card for *Amanita muscaria*. A list of subsidiary characters not printed on the cards for Agaricaceae and Polyporaceae is included.

Petrak (F.). **Kritische Bemerkungen über einige, in letzter Zeit als neu beschriebene Askomyzeten und Fungi Imperfecti.** [Critical observations on some Ascomycetes and Fungi Imperfecti recently described as new.]—*Sydowia* (*Ann. mycol., Berl.*, Ser. II), i, 1–3, pp. 61–79, 1947.

In the course of his mycological studies and consultations of the pertinent literature the author has encountered a number of Ascomycetes and Fungi Imperfecti described as new species or transferred to other genera on erroneous and untenable grounds. Among those critically discussed in the present contribution are: *Helminthosporium cactacearum* Bongini on Cactaceae in Italy [*R.A.M.*, xii, p. 27] is identical with *H. cactivorum* Petr. (*Gartenbauwiss.*, p. 266, 1931); *Septoria nodorum*, included by Frandsen in his proposed section *Microseptoria*,

[*R.A.M.*, xxv, p. 155], is a typical *Hendersonia* and should be referred to *H. nodorum* (Berk.) Petr.; Frandsen's new genus *Lunospora*, with its type species *L.* (*S.*) *oxyspora*, is identical with *Selenophoma* [ibid., xxiv, p. 512]; *Sphaeronema bustinzae* Unamuno on clover (*Trifolium repens*) in Spain is doubtless a form of *Stagonospora meliloti* (Lasch.) Petr. [ibid., xviii, p. 320] with a rather better developed ostiole; *Sphaeropsis ellisii* Sacc. var. *cromogena* Goidànich [on pine and timber] in Italy [ibid., xiv, p. 727] is one of the numerous forms of *Macrophoma pinea* (Desm.) Petr. & Syd.; and *Stagonosporopsis trifolii* (Cav.) Chochr. [ibid., xi, p. 654] is identical with *Stagonospora meliloti*.

Viégas (A. P.). **Alguns fungos do Brasil. XIII. Hifomicetos.** [Some fungi of Brazil. XIII. Hyphomycetes.]—*Bragantia, S. Paulo*, vi, 8, pp. 353–442, 37 pl., 21 figs., 1946.

Included in this further instalment of the author's critically annotated list of Brazilian fungi [cf. *R.A.M.*, xxvi, p. 219], besides 20 new species and one new combination, are the following records: *Alternaria macrospora* on cotton [ibid., xiii, p. 3; xxvi, p. 14]; *A. solani* on potato and *Datura stramonium*; *A. sonchi* [ibid., x, p. 541] on chicory, endive, lettuce, and *Zinnia elegans*; *Asperisporium caricae* on papaw [ibid., xxv, p. 578]; *Beauveria bassiana* on *Thrips* sp., silkworms (*Bombyx mori*) [ibid., xxi, p. 289], *Doru linearia*, and the coffee berry borer, *Hypothenemus* [*Stephanoderes*] *hampei* [ibid., xxvi, p. 235]; *Botrytis cinerea* parasitic on rose [ibid., xviii, p. 295; xix, p. 540]; *Cerebella andropogonis* on *Hyparrhenia rufa* [ibid., xvi, p. 599], *Panicum maximum*, *Paspalum plicatulum*, and other Gramineae; *Cladosporium fulvum* on *Solanum nigrum*; *Fusarium aquaeductum* [ibid., xii, p. 58; xxi, p. 103] on cassava; *F. graminum* [ibid., xiv, p. 571; xvii, p. 154] on *P.* sp.; *F. moniliforme* [*Gibberella fujikuroi*] on summer wheat and maize; *F. oxysporum* var. *cubense* and *Helminthosporium torulosum* [ibid., xix, p. 663] on banana and plantain; *H. turcicum* on maize; *Ramularia areola* [*Cercosporella gossypii*, the imperfect state of *Mycosphaerella areola*: ibid., xvi, p. 838] on cotton (*Gossypium hirsutum*); *R. tulasnei* [or *R. grevilleana*: ibid., xxv, p. 185], the conidial state of *Mycosphaerella fragariae*, on strawberry; *Stachylidium theobromae* on banana [ibid., xxi, p. 324]; *Thielaviopsis* [*Ceratostomella*] *paradoxa* on pineapple [ibid., xxvi, p. 287], plantain, and banana; and *Verticillium albo-atrum* on cotton (*G. hirsutum*) [ibid., xxiv, p. 413], tomato, and eggplant.

Thirumalachar (M. J.). **Some new Sphaceloma diseases of economic plants in Mysore.**—*Trans. Brit. mycol. Soc.*, xxxi, 1–2, pp. 1–6, 9 figs., 1947.

This is an account of four species of *Sphaceloma* already noted from another source [*R.A.M.*, xxvi, p. 565].

Savile (D. B. O.). **A study of the species of Entyloma on North American Compositae.**—*Canad. J. Res.*, Sect. C, xxv, 3, pp. 105–120, 1 pl., 1947.

Studies of *Entyloma compositarum* [*R.A.M.*, xxiv, p. 5] and *E. polysporum* on various hosts revealed a great confusion between them arising from the misnaming of certain specimens in American exsiccata and the inadequacy of the original descriptions. It is suggested that when describing these fungi the following characters should be given: the minimum and maximum measurements of length, width, and wall thickness of chlamydospores, the density of their distribution, and the presence or absence of conidia or conidiophores. Most of the North American collections of *E.* spp. on Compositae belong to two well-defined species, *E. compositarum* and *E. polysporum*, the latter being very similar to the European species *E. calendulae* [ibid., xxvi, p. 216] and may have to be included in it. *E. polysporum* has densely crowded chlamydospores, displacing most of the chlorenchyma tissue and measuring 9 to 17 by 8·5 to 13·5 μ with walls mostly 1 to 3 μ thick;

t has no conidia. The chlamydospores of *E. compositarum*, generally abundant ut not densely crowded or displacing the chlorenchyma tissue, are 8 to 13 by 7·2 o 11·5 μ, with walls 0·7 to 1·5 μ thick; the conidia are either falcate, 7 to 25 by to 3·5 μ, or acicular, 26 to 46 by 1 to 1·5 μ; the amphigenous or hypophyllous onidiophores (according to the host) are mostly densely crowded in stromata.

Three European *Calendula officinalis* specimens examined bore what is probably *?. calendulae* with slightly smaller, less crowded spores than those of *E. polysporum*. he American specimen on this host (ex Cornell 15903) is best assigned to *E. com- ositarum*; it has abundant conidia, whereas none are produced on *Calendula* in urope. *Chrysanthemum* and related genera do not seem to be attacked by these ungi in North America. Those on *Dahlia* are considered to form part of the '*Calen- ulae-polysporum*' complex and prior to further studies may be left as *E. dahliae*.

All American specimens on *Gaillardia* are *E. compositarum* [loc. cit.]; *E. gail- ardiae* has much larger spores and is clearly distinct from it. *Helenium autumnale* ore typical *E. compositarum*. The three specimens on *Rudbeckia hirta* have hlamydospores with remarkably thick walls so that the adoption of Ciferri's ame *E. davisii* [ibid., vii, p. 674] is justified. The fungus on *R. laciniata* is *?. compositarum*.

ARCHIONATTO (J. B.). **Nota crítica sobre 'Moniliopsis aderholdi'.** [A critical note on *Moniliopsis aderholdi*.]—*Rev. Fac. Agron. La Plata*, xxvi, 1, pp. 1–4, 1 col. pl., 1 fig., 1946. [English summary.]

In the course of a study on the strains of *Rhizoctonia* [*Corticium*] *solani* at the nstitute of Plant Hygiene, Buenos Aires, the author observed that the morpho- gical characters of *R.* sp., isolated from violet roots in 1933, corresponded with hose described for *Moniliopsis aderholdi*. Duggar's view as to the identity of these wo fungi was disputed by Müller [*R.A.M.*, ii, p. 470] and Wallensiek [ibid., iii, . 557], but upheld by Thomas [ibid., iv, p. 444] and by Baldacci and Cabrini bid., xix, p. 161]. In order to settle the matter, a comparative investigation was ade of the pathogenicity to eggplant and violet seedlings of the above-mentioned olate of *R.* sp. and a strain of *M. aderholdi* of the same year. Uniformly negative sults were obtained, indicating that *M. aderholdi*, like *C. solani*, loses its virulence prolonged culture [ibid., xxvi, p. 281]. Marked variations were further observed the morphological characters of the several strains of *C. solani*, some of which roduced the hormodendroid mycelia typical of *M. aderholdi*, though in a less ronounced form.

The results of these studies are considered to confirm the generic identity of *M. aderholdi* with *R. solani*, but that the species are distinct. The former is ccordingly renamed *R. aderholdi* [n. comb.] and Burchard's *M. klebahni* [ibid., ix, . 133] is regarded as a mere variant of it.

ETCH (T.). **A revision of Ceylon Marasmii.**—*Trans. Brit. mycol. Soc.*, xxxi, 1–2, pp. 19–44, 3 col. pl. [facing p. 44], 1947.

This revision of the *Marasmius* spp. described by Berkeley and Broome in 'Fungi of Ceylon' includes re-descriptions of the specimens originally collected by hwaites in Ceylon, a number added by the author, and several doubtful and xcluded species; Latin diagnoses of the new species are appended.

ALLEAU (W. D.). **Clubroot of Tobacco: a wound-tumorlike graft-transmitted disease.**—*Phytopathology*, xxxvii, 8, pp. 580–582, 1 fig., 1947.

'Club root' of tobacco, so named because of the similarity of the enlarged roots those of cabbage affected by the disease of the same name [*Plasmodiophora assicae*], was first observed in Kentucky in 1922 [*R.A.M.*, xii, p. 117] and appeared in 1946. The causal organism was assumed to be a virus, and the

positive results of experiments with cuttings and grafts indicated that it was systemic. The Kentucky tumours closely resemble those induced by Black's wound-tumour virus [ibid., xxiv, p. 511] and are probably caused by the same or a closely related agent. The tobacco disease attributed by Trotter in Italy to *Bacterium tumefaciens* [ibid., xxvi, p. 34] also presents close analogies with club root.

SELMAN (I. W.). **Resistance to mosaic infection in the Tomato in relation to soil conditions.**—*J. Pomol.*, xxiii, 1–2, 2 figs., pp. 71–79, 1947.

In further glasshouse experiments with fruiting Potentate tomato plants leaflet-inoculated with diluted sap containing yellow mosaic virus [a strain of tobacco mosaic virus: see below, p. 112], various fertilizers (0 to 4 oz. dried blood, 0 to 16 oz. superphosphate, 0 to 2 oz. potassium sulphate, and 0 to 28 lb. dung per sq. yd.) and two levels of watering (very slight and abundant) were given. The highest incidence of systemic virus invasion occurred on the wet plots, on which only five out of 106 plants remained virus-free, compared with 14 of 111 on the dry plots. The best treatment was 1 oz. dried blood plus 1 oz. superphosphate per sq. yd. coupled with the low moisture-level, five out of 16 plants being virus-free. In some cases tobacco mosaic virus was present in the roots but not in the shoots, arising presumably from root infection.

It is suggested that excessive manuring with concentrated fertilizers and over-watering increase the susceptibility to virus invasion. The evidence indicates that some form of resistance to systemic infection by the tobacco mosaic virus may occur in the tomato, and it should be possible to modify soil and climatic factors in such a way as to obtain some degree of resistance in tomatoes for practical purposes.

MUMENTHALER (E.). **Das Ulmensterben in Bern.** [Elm mortality in Berne.]—*Schweiz. Z. Forstw.*, xcviii, 6, pp. 239–242, 1947.

The Dutch elm disease (*Ophiostoma* [*Ceratostomella*] *ulmi*) was first observed in Berne in 1929 [*R.A.M.*, xii, p. 194]. Between 1942 and the end of 1945 the city's elm population fell from 1,676 to 1,068, i.e., by 608, or 36 per cent. The wood is much sought after for turnery, cabinet-making, and the like, but few of the felled trees are suitable for these purposes. The presence of the fungus at Thun was confirmed in 1941, between which year and 1946 it was necessary to fell 130 trees belonging to the municipality.

WILSON (E. E.). **The branch wilt of Persian Walnut trees and its cause.**—*Hilgardia*, xvii, 12, pp. 413–430, 4 pl. (1 col.), 1 fig., 2 graphs, 1 map, 1947.

Exosporina fawcetti n. sp. is the name proposed for the agent of a sudden wilt of Persian walnut (*Juglans regia*) in California, where the disease was first observed ten years ago in the San Joaquin Valley and during the past five or six years has assumed major importance on certain varieties, notably Franquette and Mayette throughout the central valleys of the State. The Payne, Eureka, Meylan, Blackmer and Bijou varieties are also susceptible, but Concord displays some degree of resistance. During July and August the leaves on some branches wither, turn dee brown, and shrivel, though remaining attached to the twigs. From the outer branches the wilt spreads to their limbs, and within a few years may involve most of the crown, killing some of the limbs outright and so weakening others through extensive bark and wood necrosis that they develop only scanty and sickly foliage and finally succumb. Cortical necrosis commonly originates on the upper side of the branch, sometimes at a sunburned spot or round injuries inflicted by harvesting implements. The wood underlying the diseased bark is dark grey to black, the discoloration often extending for some distance up and down the branch beyond

the necrotic cortical area. The xylem elements are filled with a dark brown substance and the vessels are occupied by many tyloses. A conspicuous feature of wilted branches, facilitating their recognition even during the winter, is the loosening and sloughing-off of the periderm, exposing wide areas of cortical tissue covered by a dark brown to black, powdery deposit, composed of the spores of the fungus.

The native black walnuts, *J. hindsii* and *J. californica*, used as rootstocks for *J. regia*, do not sustain appreciable damage from branch wilt. The European chestnut (*Castanea sativa*) is susceptible to the disease, which was also found on lemon trees in Tulare County in 1946. The affected trees were reported to have been injured by frost in 1938, but the connexion, if any, between the damage then sustained and the development of branch wilt is not clear. Fawcett [*R.A.M.*, xv, p. 574] records the occurrence of a similar trouble in the same county on frost-injured grapefruit and orange trees in 1923.

Branch wilt is noticeably more prevalent on unthrifty Persian walnut trees, e.g., those suffering from crown rot [of unspecified origin] and root rot (*Armillaria mellea*). A relatively high proportion of cankers develop round areas of bark injured by exposure to the sun, the incidence of branch wilt sometimes being two or three times higher on the south than on the north side of the tree. With the exception of replants in mature orchards, young walnuts (up to 10 or 15 years) are usually less affected by branch wilt than older ones.

E. fawcetti was isolated in pure culture from the bark and wood of over 90 per cent. of recently wilted branches. Rapid growth was made at or above 25° C. and especially from 30° to 33° on potato dextrose, oatmeal, and malt extract agars; at or below 16° and above 33° development was slower. Numerous pulvinate, sessile, fuscous sporodochia, 400 μ in diameter and 150 μ in height, are formed, each consisting of compact, parallel, occasionally branched chains of globoid to slightly angular, dark brown, mostly uni-, rarely bi- to tricellular conidia (arthrospores), 3 to 8 (mean 5·5) μ in diameter, arising from a slight hypostroma. Adjacent to the hyphae are torulose, dark brown hyphae, separating into numerous cells or segments. On some media the fungus produces large numbers of dark, profusely branched sporophores, emerging singly or in small groups from the substratum and becoming septate throughout their length with advancing maturity; the segments develop thick walls and a dark brown coloration and readily separate into viable arthrospores.

The type of fruiting structure produced by the walnut pathogen on most media would point to its accommodation in the genus *Torula*, and the above-mentioned agent of citrus wilt investigated by Fawcett was, in fact, referred to *T. dimidiata* Penzig. However, the development of sporodochia without setae, the virtual absence of conidiophores, and the smooth, catenulate arthrospores denote a relationship of the walnut fungus with *Exosporina*, to which it is accordingly assigned. *E. fawcetti* differs from the type species, *E. laricis*, in the more variable dimensions of its conidia, the presence of a hypostroma, and the frequent branching of the conidial chains. The toruloid conidiophores of *Hendersonula toruloidea* [ibid., xiv, p. 83] are rather similar to the corresponding organs in *E. fawcetti*, but the former species produces pycnidia and pycnospores, which do not appear to figure in the life-history of the latter. A species of *Dothiorella* is very common on blighted walnut twigs, but seems to make slow progress through the branches and to induce no prominent symptoms comparable with those of branch wilt.

In comparative inoculation experiments with branch wilt isolates from grapefruit (supplied by Fawcett), chestnut, and *J. regia* on young Franquette Persian walnuts, all three caused extensive infection, the particularly active chestnut strain killing the trees in 19 days. The three isolates were recovered from the wood in areas 4 to 6 in. from the site of inoculation. The grapefruit strain consistently

grew more slowly on potato dextrose, nutrient, and Czapek's agars than the other two strains, but the differences were less marked after passage through walnut trees, indicating that the host modifies the growth rate. The colour of the arthrospores from the three foregoing hosts and lemons was paler in the two kinds of citrus.

From comparative studies of the mode of sporodochial production in culture it is concluded that the grapefruit isolate cannot be differentiated from the walnut and chestnut strains of *E. fawcetti* on the basis of sporodochial structure and spore shape on maize meal agar.

It is not clear, at the present juncture, how a reclassification of the citrus pathogen would affect the taxonomic status of *T. dimidiata*, in which no alteration, therefore, is proposed for the time being.

Miller (P. W.). **Further investigations on the control of Walnut blight by dusting.**—*Proc. Ore. St. hort. Soc.*, xxxviii, pp. 128–129, 1946.

Further investigations on the control of walnut blight [*Xanthomonas juglandis*: *R.A.M.*, xxv, p. 372; xxvi, p. 65] in Oregon have shown that four applications of a copper+lime+sulphur+oil (20–40–10–1·5) dust, at approximately weekly intervals from the early pre-blossom stage, reduced infection from 12·5 to 1·5 per cent. in a locality where the rainfall during and after the blossoming period was comparatively light. In another locality, where considerably more rain fell during the post-blossom period, the same dust schedule reduced infection from 53·6 to 13·1 per cent. In order to reduce infection to below 5 per cent. under these conditions, six applications should be made, three before and three after bloom. Statistics have shown that this programme, while very profitable in a bad blight year, is also profitable in a normal year. Good coverage should be obtained by dusting from opposite sides of the tree, applications being made preferably in the early morning.

Billings (R. W.). **Future forest tree disease control with special reference to blister rust.**—*J. For.*, xlv, 8, pp. 586–589, 1947.

Believing that forest tree diseases cannot be completely eliminated but merely prevented from developing on an epidemic scale by proper silvicultural treatment, the author develops this thesis with special reference to its application in the western United States white pine (*Pinus monticola*) blister rust [*Cronartium ribicola*] control programme.

Biraghi (A.). **Un nuovo fungo lignicolo: Scopularia halepensis n. sp.** [A new lignicolous fungus: *Scopularia halepensis* n. sp.]—*Ann. Sper. agr.*, N.S., i, 1, pp. 115–122, 8 figs., 1947. [English summary.]

In 1940 specimens of discoloured wood, killed by an unidentified blister rust, from dead branches of a few *Pinus halepensis* trees at Paraggi in the province of Genoa, bore abundant pycnidia of *Sphaeropsis ellisii* [*Diplodia pinea*: *R.A.M.*, xxv, p. 493] and yielded also in culture *Scopularia halepensis* n. sp. Artificial inoculations with *S. halepensis* established that the fungus invades only dying or dead wood, the mycelium passing from the medullary ray cells into the woody elements through the pits. The dark tissue discoloration is due to the presence of brown hyphae.

Chasmukhin (V. Y.). Экология эпифитотий заповедных Еловых лесов. [The ecology of epidemics in Pine wood preserves.]—*Советск. Бот.* [*Sovetsk. Bot.*], xv, 1, pp. 17–26, 1947.

The results of this study indicate that the pine wood ground flora suffers only negligibly from fungal attacks. The plants are classified into three groups according to their susceptibility, (1) those apparently immune, (2) those which are attacked,

ut the infection causes no great harm, and (3) plants subject to widespread epi-emics. Plants of group (3) occur especially in leafy tree groves.

[ARTIGAN (D. T.). **Fungi in the forest.**—*Aust. Timb. J.*, xiii, 2, pp. 90–91, 111, 115, 3 figs., 1947.

The author explains the importance of forest pathology, a virtually unexplored eld in Australia, and suggests some approaches to the problems concerned in its ivestigation. The fungi illustrated by photographs from New South Wales are *'rametes lactinea* [*R.A.M.*, xiv, p. 611; xvii, p. 88], *T. lilacino-gilva* [ibid., viii, . 80], and *Polyporus* sp.

VRIGHT (E.), RHOADS (A. S.), & ISAAC (L. A.). **Decay losses following logging injury in partially cut stands of Western Hemlock and Sitka Spruce.**—Reprinted from *Timberman*, xlviii, 10, 3 pp., 4 figs., 1 graph, 1947.

The investigation started in 1943 [cf. *R.A.M.*, xxiv, p. 299] in forests of the 'acific Northwest, to determine the amount of decay resulting from logging injuries, as been extended to reserve stands of western hemlock [*Tsuga heterophylla*: ibid., xvi, p. 321] and Sitka spruce [*Picea sitchensis*: loc. cit.]. Decay (due principally to *'omes annosus* and *F. pinicola*) was found under 50 per cent. of the trunk wounds, n 75 per cent. of the broken tops, and all the sun-scald lesions. Since the logging ook place decay following injury has amounted to 41 per cent. of the calculated ross increment of *T. heterophylla* and 43 per cent. of that of *P. sitchensis*. *F. anno-us* caused about 50 per cent. of the commercial decay in trunk wounds of *T. hetero-hylla* and *F. pinicola* [ibid., xxvi, p. 233] accounted for 60 per cent. of the rot olume of *P. sitchensis*. The number of trunk scars found on spruce was 104 and n hemlock 600; the majority were 2 to 4 ft. long and about 1 ft. wide. Out of gross olumes of 28,849 cu. ft. of hemlock and 5,933 of spruce, 11·1 and 12 per cent., espectively, were cull resulting from decay following injury, the loss of saw timber eing 10·6 and 11·1 per cent., respectively. Such decay losses following partial utting can only be reduced by a reduction in the amount of logging injury, much of hich might be avoided by the use of lighter machinery or horses in skidding, by con-ning skidding to main skid roads having a minimum of curvature and to a time hen the trees are least susceptible to injury, and by the removal of severely injured rees at the close of each cutting operation. Lighter cutting also results in less injury.

'EHRSON (S.). **A bacterium occurring in wet mechanical pulp producing a heat-stable, highly fungicidal substance. Preliminary report.**—*Svensk bot. Tidskr.*, xli, 3, pp. 354–364, 7 figs., 1947.

Melin found in 1933 that certain yeast-like Hyphomycetes and a bacterium reatly retarded the growth and staining intensity of the blueing fungi in ground ood pulp [*R.A.M.*, xiii, p. 531]. In order to throw further light on this pheno-henon, experiments were started early in 1947 by plating samples of fresh round wood pulp from a north Swedish mill. On a medium of wort agar the acterium formed a thick, glistening, slimy, tan-grey colony in 24 hours at 35° C., hich appeared to be the optimum temperature, though growth also occurs at 23°. he organism is aerobic, Gram-negative, non-spore-forming, non-motile, appearing ngly or in pairs or chains, 1·2 to 1·8 by 0·5 to 0·6 μ.

Seven strains of the bacterium were isolated and tested against *Pullularia pullulans* bid., xxvi, p. 322] by the following methods. One-ml. portions of suspensions of fresh echanical pulp and white water were placed in Petri dishes with 1 ml. of a suspen-on of the fungus. The plates were poured with wort agar and incubated at 35° r 24 hours, whereupon they were inverted in an incubator at 23° (the optimum r *P. pullulans*). After three days the presence of the antagonist was demonstrated y the formation of clear zones surrounding its colonies in the dark fungal mycelium

covering the whole plate. From these colonies the bacteria were isolated in pure culture and re-tested for fungistatic properties. By means of this technique the bacterium was shown to abound in the test samples, its ratio to the total number of fungal diaspores developing on wort agar plates being of the order of 1:100. Of the seven strains tested, five showed marked antagonism to *P. pullulans*, forming an inhibitory zone 19 to 21 mm. in diameter measured by the Oxford method or 20 to 25 mm. by the streak plate. The following were the average diameters (in mm.) of the inhibitory zones, gauged by the latter method, in tests with one strain of the bacterium: *P. pullulans* 26, *Lecythophora* [*Phialophora*] *lignicola* [ibid., xvii, p. 559] 20, *Cladosporium* sp. 33, *Stemphylium* sp. 28, *Alternaria* sp. 31, *Trichoderma viride* 11, *Paecilomyces varioti* 17, *Penicillium* sp. 29, and *Rhodotorula* sp. 14. *Merulius lacrymans*, *Poria vaporaria*, *Lentinus lepideus*, and *Coniophora puteana* were also inhibited to a considerable extent by the bacterium.

No decrease in the fungistatic activity of the bacterium was observed after three minutes' boiling of an active broth, nor did 30 minutes' exposure to a temperature of 100° in flowing steam on each of three consecutive days reduce the antibiotic activity of such a preparation. Moreover, samples of the same broth autoclaved at 121° lost only a fraction of their efficiency. The antibiotic principle, therefore, is thermostable. Storage for one to two months at 4° (pH 4) resulted in some decrease in the fungistatic capacity of the bacterium, while at pH 11 there was a noticeable decline.

Experiments to investigate the possibility of fungicidal or lytic attributes in the antagonist showed that no growth of *Pullularia pullulans* conidia occurred at dilutions of sterilized active broth with sterile wort in the ratios between 1:1 and 1:10, and development was retarded up to, but not beyond, 1:25. No lytic effect resulted from the addition of sterile active broth to sterile wort inoculated with conidia of *P. pullulans* in the ratios of 1:1 and 2:1, but the germinated cells underwent plasmolysis and died.

Creosoting sleepers for tropical railways.—*Wood, Lond.*, vi, 5, pp. 147–148, 4 figs., 1947.

Owing to the depredations of termites and dry rot [? *Merulius lacrymans*], the service life of wooden sleepers on tropical railways has been estimated at only seven years compared with 30 to 35 for steel. Early in 1943 tests were started at the research department of the Southern Railway in England on the possibilities of impregnation against these pests, and nearly three years later a plant covering an area of ¼ mile by 100 yds. and having an average capacity of 750 sleepers a day was erected at Zungeru on the Nigerian Railway for the treatment of hardwoods from the Southern Provinces. This sleeper treatment depot is now in full operation. After passage through the adzing and boring machine, which can turn out over 900 sleepers daily, the timber is thoroughly impregnated with hot creosote under pressure. Six trolley-loads, over 250 sleepers at a time, are wheeled into long cylinders, which are then hermetically sealed. The air is sucked out and in the resulting vacuum creosote at a temperature over boiling-point is forced into the cylinders. They are then loaded on to waiting trucks and taken to a 160-mile-long section of the railway where re-laying is in progress. A treated wooden sleeper costs about 17*s.* and it is hoped to pay for the plant, assessed at £20,000, out of the saving thereby effected. It will be ten years before the resistance of the creosoted sleepers can be fully appraised.

Roland (G.). **La lutte contre la jaunisse de la Betterave.** [The control of Beet yellows.]—*Parasitica*, iii, 3, pp. 131–132, 1947.

For the control of virus yellows of beet [*R.A.M.*, xviii, p. 429; xxvi, pp. 179] the author recommends growing the 'stecklings' in disease-free areas in Belgium

or in localities, such as the high plateaux of the Ardennes, where the insect vectors (mainly *Myzus persicae* and *Aphis fabae*) develop very late in the season. Also, crops should not be planted in the vicinity of beet seed-crops or winter spinach. Beet silos should be removed before seed harvest time or, at least, shoots coming from them should be destroyed. Insecticidal measures are essential not only in beet fields but for spinach, broad bean, and other hosts of the insect vectors. Cultural practices should be improved and early sowing practised. Every effort should be made to develop resistant varieties.

Lauffer (M. A.) & Price (W. C.). **Electrophoretic purification of southern Bean mosaic virus.**—*Arch. Biochem., N.Y.*, xv, 1, pp. 115–124, 2 diags., 1947.

A preparation of southern bean mosaic virus [*R.A.M.*, xxvi, p. 276], containing pigments not removable by centrifugal fractionation or even by crystallization, was purified by means of electrolysis in the standard Tiselius electrophoresis apparatus. Solutions of the virus could be concentrated merely by equilibrating across a cellophane membrane with white of egg. On the completion of this process two preparations of purified virus were obtained by subjecting juice from infected bean [*Phaseolus vulgaris*] plants to electrolysis in the Tiselius apparatus.

Presley (J. T.) & Allington (W. B.). **Brown stem rot of Soybean caused by a Cephalosporium.**—*Phytopathology*, xxxvii, 9, pp. 681–682, 1947.

On potato dextrose, oatmeal, and potato dextrose-raisin agars the causal organism of brown stem rot of soy-beans in Illinois (abs. in *Phytopathology*, xxxvi, p. 394, 1946) makes extremely slow growth. The few detached conidia produced on these media were readily suspended in sterile water by gently flooding the surface of a two-month-old culture, and on transference to 2 per cent. water agar they germinated freely, forming conidiophores with conidia attached in eight to ten days at room temperature. Younger cultures were induced to sporulate by dividing a small portion of the mycelial mat very finely and placing the fragments on water agar. Two other substrata promoting the sporulation of the fungus are (1) 2 per cent. each of rice polish and agar, and (2) 2 per cent. agar supplemented by an extract of green soy-bean leaves and stems before autoclaving. The latter, perhaps the best of the media tested for fruiting, is prepared by the pulverization of 15 to 20 gm. plant tissue in a Waring Blendor in 100 c.c. water, filtering through cheesecloth, and adding to 900 c.c. of the agar-water mixture. The addition of sucrose to the medium strongly inhibited or suppressed sporulation.

The ellipsoid, hyaline conidia, measuring 2 to 5 by 1·5 to 2·5 μ, are produced in heads of irregular shape on short, usually unbranched conidiophores. Drs. J. A. Stevenson and B. W. Henry independently identified the fungus as a species of *Cephalosporium*. The former furnished a culture of *C. acremonium* for comparison with the soy-bean pathogen which in preliminary tests proved non-parasitic on maize, in contrast to *C. acremonium* [*R.A.M.*, xviii, p. 367 *et passim*], grew much more slowly on all the media used, and sporulated less freely. Further studies are thought likely to establish it as a new species.

Hervey (G. E. R.) & Schroeder (W. T.). **Life cycle of Macrosteles divisus in relation to Carrot yellows in western New York.**—*J. econ. Ent.*, xl, 4, pp. 505–508, 1 fig., 1 graph, 1947.

Carrot yellows, caused by the aster yellows virus [*R.A.M.*, xxv, p. 248] and transmitted by the six-spotted leafhopper (*Macrosteles divisus*), has increased during the last few years in western New York to a point at which production of the crop is threatened. Surveys of carrot fields in 1944, 1945, and 1946 revealed average infection percentages of 30, 28, and 53, respectively, the rise in the last

year corresponding to an increase in the leafhopper population. The results of life-history studies showed that the insect commonly hibernates on winter grains, probably in the egg stage, being present in the nymphal phase on wheat, rye, and barley in May and June. Evidence was further obtained suggesting that the leafhopper also overwinters on [unspecified] grasses, while it may possibly survive the winter in the adult stage under local conditions.

The incidence of carrot yellows appears to be related to earliness of migration from the overwintering areas and subsequent leafhopper abundance in the fields. In a field of Red Core Chantenay to which the insects migrated from a 300-ft. distant barley field between 20th May and the end of June, 1946, a trace of the disease was observed on 9th July and infection increased rapidly until harvest, an average of 76 per cent. of the plants showing visible symptoms at the last record. The real incidence, however, was much higher, as demonstrated by the development of yellows on selected, apparently healthy roots when grown in the greenhouse after a two months' rest period. Moreover, even the few plants (3 or 4 per cent.) actually free from the virus at harvest succumbed to a later infestation by viruliferous leafhoppers.

Bardin (R.) & Fong (R.). **Phoma root and crown rot of Celery.**—*Bull. Dep. Agric. Calif.*, xxxvi, 3, pp. 105–106, 1 fig., 1947.

In the autumn of 1945 a basal rot of celery occurred in the Salinas Valley of Monterey County. Inoculations with cultures from the pycnidia of the fungus, identified as *Phoma apiicola* [*R.A.M.*, xi, p. 91; xxiv, p. 51], readily produced the disease. Root or crown rot is favoured by cool weather and high soil moisture. No immune varieties are known but White Plume, Giant Pascal, and Easy Blanching are less susceptible than other varieties. The control measures recommended are sanitation and crop rotation, especially in the seed-bed, because the fungus can exist for at least a year in infected celery refuse; careful handling of seedlings in order to avoid injuries; and no immersion of transplants prior to planting, since water permits the discharge and spread of spores from the pycnidia on infected seedlings.

Wild (H.). **Downy mildew disease of the cultivated Lettuce.**—*Trans. Brit. mycol. Soc.*, xxxi, 1–2, pp. 112–125, 1947.

Studies on downy mildew of cultivated lettuce caused by *Bremia lactucae* [*R.A.M.*, xxvi, p. 3] carried out over the two seasons 1939 to 1940 and 1940 to 1941 in the Thames Valley have shown that seedlings grown from ordinary commercial seed and from seed of infected mother plants almost invariably failed to develop mildew under favourable conditions for the fungus. The likelihood of seed-borne transmission is therefore negligible. Experiments in which seed was grown in soil containing debris from infected plants showed that any viable fungal remains in it, such as portions of mycelium (oospores apparently being rare), were ineffective in transmitting the disease, as out of 5,000 resultant seedlings only one contracted mildew. There was no possibility of carry-over by conidia as viability was lost after the sixth or seventh day. Transmission experiments with wild hosts showed that only *Lactuca scariola* and *L. saligna* could be infected with *B. lactucae* and from them it could be transmitted to lettuce [cf. loc. cit.]. As both these species are uncommon in England they can be of no importance in this connexion. The conclusion to be drawn from these experiments indicates that each lettuce crop can only be infected from a previous one.

The economic importance of *B. lactucae* lies in the fact that it renders plants more susceptible to attack by *Botrytis cinerea*, delays the date of maturing, lowers the rate of survival, and causes disfigurement by the lesions. The fact that mildew appears in quantity both in frames and out of doors, especially in mild, wet winters,

ıdicates that ventilation does not give adequate control under conditions highly ıvourable to mildew development, although it does reduce incidence materially nder less humid conditions. Experiments with various fungicides showed that the ɔpper-containing sprays, Bordeaux (2:2:40), excess-lime Bordeaux (2:10:40), a ɔdium orthophosphate–copper sulphate spray [ibid., xix, p. 667], and cuprocide 54 l lb. to 50 gals.), although giving adequate mildew protection, were phytocidal, ɔpecially the Bordeaux mixture and in cold weather.

[UNCIE (J. H.). **Cucumber diseases.**—*Canner*, civ, 16, pp. 12–13, 1947.

. The following diseases are of major importance in the cultivation of cucumbers ɔr pickling in Michigan: anthracnose [*Colletotrichum lagenarium*], mosaic [cucumer mosaic virus], bacterial wilt [*Erwinia tracheiphila*: *R.A.M.*, x, p. 500 *et passim*], ɔab [*Cladosporium cucumerinum*: ibid., xxvi, p. 375], and *Macrosporium* leaf blight *Alternaria cucumerina*: ibid., x, p. 431]. Angular leaf spot [*Pseudomonas lacrymans*: ɔid., xxi, p. 341; cf. also xxvi, p. 279] is also present in the State, but its extent nd severity vary from year to year. The seed-borne agents of anthracnose, scab, nd angular leaf spot may be largely eliminated by five minutes' immersion of the ɔed in mercuric chloride (1 oz. in 7½ gals. water). After drying, a further treatment ıay be given in the form of semesan, arasan, yellow cuprocide, or spergon dust ɔr the prevention of seedling damping-off. The extermination of the striped ıcumber beetle [*Diabrotica melanocephala*], the sole carrier of *E. tracheiphila*, is ɔn essential step in the control of bacterial wilt. The spread of the cucumber ıosaic virus may be impeded by the exclusion from the pickle fields of its perennial ɔeed hosts, e.g., ground cherry [*Physalis* sp.], milkweed [*Asclepias syriacea*], ɔokeweed [*Phytolacca decandra*], and catnip [*Nepeta cataria*], and mowing them own over a radius of 150 ft. on all sides. When infection is observed on young lants, they should be cut off with a hoe and covered up with soil. The virus is ɔnveyed by handling from diseased to healthy plants, and contact with the former ıould therefore be avoided as far as possible. Washing the hands with strong ɔapsuds will destroy the virus. Much of the trouble from disease is directly ɔaceable to gathering the cucumbers when the vines are wet with rain or dew, ınder which conditions *Colletotrichum lagenarium*, *Cladosporium cucumerinum*, *Pseudomonas lacrymans*, and *Alternaria cucumerina* pass readily from infected to ɔund plants on the pickers' hands.

Alternaria leaf blight is probably the most difficult to control of all the diseases ınder discussion. It usually appears on the vines after they have matted in between ıe rows. Spraying with a fixed copper (4 lb. in 100 gals.) should be begun when ıe vines are 12 to 18 in. long and continued at 10- to 14-day intervals while the ants are small; later in the season more frequent applications are necessary, ɔpecially in wet weather. If preferred, Bordeaux mixture (6 to 8—3 to 4—100) ay be substituted for the fixed copper after the plants are half-grown; applied at ı earlier stage it causes stunting and foliar scorch. Spraying is generally more ffective than dusting but not always practicable where acreages are large and ɔbour short. A 5 per cent. metallic copper dust may be applied at the rate of 40 ɔ 60 lb. per acre, using a hand machine of the bellows type in the early stages of ɔwth and a row crop power-driven duster on well-developed vines. The dust ıould be directed at a sharp angle towards the ground, so that a cloud of dust ıcends through the vines, coating the lower as well as the upper surface, and ffficient pressure should be generated to make the leaves dance in the spray.

IRKINS (F. C.). **A Verticillium disease of cultivated Mushrooms new to Great Britain.**—*Trans. Brit. mycol. Soc.*, xxxi, 1–2, pp. 126–127, 1947.

White strains of the cultivated mushroom (*Psalliota campestris*) at Yaxley, untingdonshire, and Thornham, Norfolk, have recently been subject to attack

by *Verticillium psalliotae*, first described in Denmark [*R.A.M.*, xxv, p. 93] where it attacked the brown strain. White mushrooms at Yaxley were successfully inoculated with the fungus, the vigorous mycelial growth being visible to the naked eye after 48 hours at 20° C. Preliminary investigations have shown that *V. psalliotae*, when grown on 2 per cent. malt agar (pH 5·5) at fluctuating laboratory temperatures produced conidia 4·3 to 12·9 by 1·75 to 2·15 μ broad compared with Treschow's measurements of 6 to 10·5 by 2 to 3·5 μ [loc. cit.].

Mehta (P. R.) & Mundkur (B. B.). **Some observations on the rust of Gram (Cicer arietinum L.).** *Indian J. agric. Sci.*, xvi, 2, pp. 186–192, 1 fig., 1 graph, 1946.

This study describes the morphology and symptoms of gram (*Cicer arietinum*) rust [*Uromyces ciceris-arietini*: *R.A.M.*, xviii, p. 549; xx, p. 136]. The uredospores germinated well in 0·05 per cent. malic acid solution and in distilled water, 20° to 26° C. being the optimum temperature both for germination and growth of the germ-tubes. Uredospores stored at room temperature or in soil in pots lost their viability in two to four weeks, but if stored at 6° they kept viable for a long time. It is therefore concluded that rust epidemics in India are not due to over-seasoning uredospores. Gram leaves floating on sugar solutions and plants growing in pots were readily infected by uredospores from the previous season stored at 6°. The incubation period was about 27 days at 8°, but only 11 to 13 days at 20° to 24°. Teleutospores could not be germinated. Different gram varieties were tested for resistance; some showed seedling resistance, which was lost at a later stage. One variety IP82, susceptible in the seedling stage, was only mildly attacked later. Of 60 varieties cultivated at Karnal 29 bore no rust pustules in 1939.

Selman (I. W.). **The growth of the plant in relation to the incidence of virus infection.**—*J. Pomol.*, xxiii, 1–2, pp. 50–62, 1947.

This study presents a survey of the literature dealing with the relationship between incidence of virus disease and the environment [*R.A.M.*, xx, p. 269]. The author recognizes two types of symptom suppression, one where environmental adjustment often leads to the prompt appearance of suppressed symptoms, for instance in tomatoes as a result of drought, nitrogen deficiency, or sometimes of excessive manuring with ammonium salts, and the other where fully infective plants never show symptoms. The problem of field resistance is discussed under the headings: animal vectors and the control of virus disease in the field, and the resistance of the plant to virus infection. In conclusion the author advocates intensive study of cultural and manurial treatments designed to produce plants resistant to virus infection as a supplement to the genetical approach.

Bodu (H. L.). **Une difficulté de la méthode sérologique des virus des plantes. La floculation spontanée.** [A difficulty in the serological method for plant viruses. Spontaneous flocculation.] *Bull. Soc. Chim. biol., Paris*, xxix, 1–3, pp. 257–258, 1947.

One of the most serious drawbacks to the serological method for the identification of plant viruses [*R.A.M.*, xvii, p. 124] has been found, in experiments at Liége, Belgium, on beet, potato, *Narcissus*, etc., to lie in the spontaneous flocculation of the juice at 37° C. This inconvenience may be rectified by adsorption of the alkaloids, e.g., with Lloyd's alkaloid reagent; precipitation of a labile fraction of the proteins with iron salts; freezing of the juice; adjustment of the pH to below 5 or above 7·5; precipitation of the alkaloids with oxalate ions; and addition of high concentrations of neutral salts to suppress the flocculation complex.

LLIAMS (P. H.), SHEARD (ENID), READ (W. H.), SELMAN (I. W.), GROSSBARD (ERNA), & OWEN (O.). **Plant diseases. Chemical investigations.**—*Rep. exp. Res. Sta. Cheshunt, 1946*, pp. 20–45, 64–70, 5 figs., 1947.

In this report [cf. *R.A.M.*, xxvi, p. 183] P. H. WILLIAMS and E. SHEARD record that in early May, 1946, young tomato plants grown in frames were attacked by *Phytophthora parasitica* [ibid., xxiv, p. 90], the fungus being probably splashed from the soil during watering. The tops of field tomatoes suffering from foot rot caused by *P. cryptogea* [ibid., xx, p. 501] were probably infected in a similar way. Many found dead after a wet and stormy period being infested with the fungus. Die-back of summer savoury (*Satureia* sp.) caused by *Botrytis cinerea*, also probably favoured by the wet weather, and root rot of arum [*Zantedeschia aethiopica*] due to *Corticium solani* [cf. ibid., xxvi, p. 59] were recorded.

An outbreak of bacterial blotch (*Pseudomonas tolaasi*) [ibid., xxiii, p. 126] occurred on mushrooms growing in a cold, damp, disused tunnel. Ventilation and dusting with copper-lime controlled the disease. Several cases of gummosis (*Cladosporium cucumerinum*) [ibid., xxvi, p. 375] of cucumber plants and fruits have been noted. The recommended control measures are the removal of the diseased fruits and leaves and spraying with colloidal copper and white-oil emulsion.

The results of further experiments by P. H. WILLIAMS on *Verticillium* wilt of tomatoes, in which plants were inoculated under the ball of roots with *V. albo-atrum* or with *V. dahliae* [loc. cit.], confirmed that warm, moist conditions (73·3° F. and 82 per cent. humidity) reduce the severity of infection by *V. albo-atrum* and are more conducive to complete recovery than ordinary conditions of temperature and moisture. Similar differences had no marked effect on plants inoculated with *V. dahliae*. Plants inoculated with *V. albo-atrum* growing in wet soil wilted one day before those which received normal watering and the severity of the disease was slightly greater under wet conditions. It is concluded, however, that high soil moisture content does not materially affect the intensity of the disease.

In manurial treatment tests on plants inoculated with *V. albo-atrum* the most severe symptoms developed in those treated with complete artificials with or without additional stable manure; the topmost leaves of most of the plants wilted and several plants died. On the minus nitrogen, minus phosphate, and minus potash plots the disease was comparatively mild, the unmanured plots being intermediate.

Inoculation experiments with *V. albo-atrum* on Butcher's Disease Resister cucumbers at 60° F. and 84 per cent. humidity confirmed that pathogenicity is favoured by low temperatures. The cucumbers proved highly resistant to *V. dahliae*.

In November, 1944, *Primula obconica* plants from Yorkshire with rotting crowns infested with a fungus wilted and died just before flowering and a similar disease was observed in the Station nursery in 1945. From both lots a species of *Pythium* was isolated. Wound inoculations of petioles and peduncles resulted in a collapse of the petioles but the fungus did not spread into the crown. A species of *Pythium* resembling *P. debaryanum* was found in the pith of young tomato plants suffering from a form of foot rot, the symptoms of which resemble those caused by *Phytophthora* spp. The pathogen, inoculated into the stems of young tomato plants, caused typical pith rot and was successfully reisolated.

Continuing her work on aerial spore transmission of *Didymella lycopersici*, E. SHEARD detected viable spores outside empty glasshouses during the winter originating apparently from infected tomato haulms which had not been burnt at the end of the season. The first spore was trapped under glass on the same day that the first infected plant was found, close to the place where the plate had been exposed. The results of tests carried out in two nurseries show that an attack of stem rot in glasshouses can be caused by air-borne spores from an outside source.

Further tests of the toxicity of various fungicides to *D. lycopersici* spores indicate that ethyl mercuric phosphate and *n*-propyl mercuric chloride are more toxic than 8-hydroxyquinoline sulphate, shirlan AG, and a proprietary tar-acid sterilizing fluid. In the presence of soil, ethyl mercuric phosphate was more effective than *n*-propyl mercuric chloride. Soil soaked with solutions of ethyl mercuric phosphate at 1 in 5,000 will remain toxic to *D. lycopersici* spores for seven weeks and at 1 in 10,000 for three weeks. Isolations from treated soil showed that most of the spores put on the soil one day after treating with 1 in 15,000 ethyl mercuric phosphate at 1 qt. per sq. yd. were killed and all were killed at 1 gal. The soil surface treated at the lower rate had ceased to be toxic in eight days, and at the higher in 15.

Tomato seedlings showing four rough leaves were each watered with 50 ml. of different concentrations of ethyl mercuric phosphate. Using 1 in 10,000, 1 in 15,000, and 1 in 20,000 solutions, the plants appeared stunted compared with the controls, the amount of damage depending on the volume of solution applied rather than on the concentration, thus, 10 ml. of 1 in 20,000 was the least injurious but 10 ml. of 1 in 15,000 or 1 in 10,000 were less injurious than 25 ml. of the weaker concentration.

Tomato plants with the first truss set were sprayed with a 1 in 15,000 solution of ethyl mercuric phosphate after the removal of the lower leaves. An hour later the wounds were lightly sprayed with a *D. lycopersici* spore suspension. The treated plants showed no lesions, the controls sprayed with water, 13. At lower concentrations the results were less favourable. Experiments showed that *D. lycopersici* favours the top $\frac{1}{2}$ in. of the soil and that penetration in steam-sterilized soil is deeper than in unsterilized. Addition of glucose to infected soil (about 1·4 per cent. by weight) markedly increased the number of diseased plants.

Experiments by W. H. Read on soil treatments for the control of *D. lycopersici* failed to confirm the results obtained in 1945, neither a 1 in 50 solution of commercial 3 per cent. formaldehyde, nor a 1 in 100 dilution of a proprietary tar-acid sterilizing fluid reduced losses due to *Didymella*.

The effects of various time intervals between the inoculation of a sterilized soil with *D. lypersici* and the application of ethyl mercuric phosphate were studied. Steamed soil was watered three days later with a spore suspension, and tomatoes were planted three days, two, four, and ten weeks after the inoculation in plots sprayed with 1 gal. per sq. yd. of a 1 in 16,000 solution of the chemical two days before planting. Counts made 12 weeks after planting showed that the percentage of plants attacked by *D. lycopersici* on the four treated plots were 22, 22, 11, and 0, respectively, for the four planting times, the corresponding figures for four unsprayed plots being 100, 100, 100, and 44, respectively, while two unsterilized, infested, sprayed plots planted three days and 10 weeks after inoculation showed 44 and 0 per cent. infected plants, respectively. All the plants were without injury. It is presumed that air-borne spores of *D. lycopersici* continually infest the soil, and the best control is obtained, therefore, if the soil is treated a few days before planting. The fungus added to sterilized soil was able to kill a high proportion of plants 12 weeks after inoculation.

I. W. Selman describes a more comprehensive experiment on tomato virus diseases of the tobacco mosaic group than that conducted in 1945 [ibid., xxvi, p. 424 and see above, p. 102]. Potted Potentate seedlings fertilized with superphosphate and dried blood were inoculated on 28th June at the 6-leaf stage with diluted leaf juice containing mild tobacco mosaic virus. At the 12-leaf stage, of the 29 plants receiving 2·5 gm. dried blood 17 were virus-free compared with 10 out of 30 receiving 5 gm. The highest infection (100 per cent.) occurred in plants receiving 5 gm. each of blood and superphosphate. Such soils on analysis were found to have the highest nitrate content. This evidence suggests that the higher level of nitrogen favoured infection. The amount of superphosphate had no apparent effect on the

incidence of infection. Considerations of growth data coupled with resistance data lead to the recommendation of 2·5 gm. dried blood and 10 gm. superphosphate for tomatoes. The health of the crop was greatly improved also by breaking up the impervious subsoil and by subsequent steaming. It is suggested that soil conditions affecting the root system are of great importance in this connexion and that unfavourable soil conditions on the whole tend to increase the susceptibility of tomatoes to systemic invasion by mosaic-inducing viruses. Plants showing no mosaic symptoms in the shoots have been found to contain active virus in the roots. Failure to keep the stream of food materials moving into the truss (or down to the roots) might result in the movement of virus from the lower leaves or roots into the young shoots, and would possibly also result in movement of virus from its secondary location in the fruits. It is concluded that vigorously growing, freely fruiting plants are most likely to be free from systemic virus invasion.

In April, 1946, among tomatoes suffering from tomato spotted wilt virus on a light, sandy soil (pH 6·7) in Bedfordshire some showed unusual disease symptoms. Typical bronzing and spotting were absent, the shoot terminated in a flower truss, and the rolled-up leaflets showed severe purpling on the under side of the veins. The plants were comparatively vigorous. Inoculated seedlings showed symptoms similar to those of the original material, but were stunted. No bronzing or leaf spotting appeared after six weeks, but the young leaves showed distortion, leaf development was irregular and similar to that occurring during late infection by the spotted wilt virus. It is presumed that the abnormal symptoms are due to a slightly modified strain of the spotted wilt virus, induced by abnormal soil conditions, such as lime deficiency [ibid., xxii, p. 8] and meteorological factors.

Work by E. Grossbard showed that *Penicillium patulum* (p. 189) when grown on fresh lawn mowings or wheat straw produces an antibiotic substance, presumably clavatin; the addition of glucose to the medium considerably increased the concentration. *P. patulum* culture extracts inhibited *B. carotovorum* [*Erwinia carotovora*] and *B. aroidea* [*E. aroideae*] at a dilution of 1:50, *B. phytophthorum* [*E. phytophthora*] at 1:80, *Phytophthora cryptogea* and *P. megasperma* at 1:160, and *P. parasitica* at 1:320. In one experiment the application of glucose to soil inoculated with *P. cryptogea* gave a great degree of protection to tomato seedlings, especially in the presence of *Aspergillus clavatus* but also in the controls. The presence of the antagonist reduced the spread of the pathogen from the centre of inoculation outwards and to a lesser degree the incidence of damping-off within the inoculated part. The addition of fertilizers increased damping-off considerably.

O. Owen (pp. 64–70) reports for the first time magnesium deficiency in commercial chrysanthemums which was confirmed by tissue analysis. Plants growing in borders in which tomatoes had previously been suspected of magnesium deficiency developed symptoms similar to those of magnesium-deficient tomato leaves. At the flowering stage interveinal pale green or yellow discoloration appeared and in acute cases spread to the midrib. Preliminary tests suggest that spraying with a solution of Epsom salts [magnesium sulphate] can correct the condition. Chrysanthemums in another nursery, grown after tomatoes, showed marked marginal discoloration and scorch, caused by potassium deficiency.

Laboratorio de Criptogamia. Ex Memoria Estación de Fitopatología Agrícola de La Coruña, 1943–1944. [Cryptogamic Laboratory. *Ex* Report of the Corunna Station of Agricultural Phytopathology, 1943–1944.]—*Publ. Estac. Fitopat. agríc. Coruña* 39, pp. 29–62, 24 figs., 1947.

The following information is contained in this report [cf. *R.A.M.*, xxiii, p. 375]. Inoculation experiments by P. Urquijo Landaluze on the hybrids between Spanish [*Castanea sativa*] and Japanese chestnuts (Shiba kuri and early and late Tamba guri varieties of *C. crenata*) developed during the period under review showed all

to be resistant to ink disease (*Phytophthora cambivora*) [ibid., xxvi, p. 364]. Positive results were obtained as follows in inoculation tests on chestnut seedlings with different isolates of *P. cambivora* (three replicates of each): Petri's 0, Leonian's 2, Dufrénoy's 1, *C. dentata* 3, walnut 2, *Erica* 3, and two of the author's 3 each. Seven out of 10 inoculations with *P. citrophthora* were successful.

Endothiella gyrosa [ibid., xv, p. 184] f. *tamba* is the name applied by J. R. Sardiña to a fungus associated with canker of the Tamba Japanese chestnut previously referred to *Cytospora* sp. [ibid., xxiii, p. 376]. *Volutella ciliata* [ibid., viii, p. 290] var. *stipita*, not hitherto reported in Corunna, occurred as a saprophyte on chestnut grafts maintained in a humid atmosphere.

The same author reports the following items. The virus responsible for a mosaic disease of the forty-day stock (*Matthiola* [*incana var.*] *annua*) [ibid., xxiii, p. 377] withstood exposure to a temperature of 54° C. It was transmitted by rubbing to 80 and 70 per cent., respectively, of the wallflower and cauliflower plants used in inoculation tests. Inoculations with the stock virus on *Malcomia littorea* consistently induced necrosis, but all attempts to reinfect stocks with the juice from *M. littorea* failed.

New records for the Station, besides those already mentioned, include *Cercospora fabae* on broad bean [ibid., xiv, p. 681], *Phoma lingam* on cabbage [ibid., xxv, p. 96], *Pseudopeziza medicaginis* on lucerne [ibid., xxv, p. 169], *Puccinia dispersa*, causing much more widespread and severe infection of wheat than *P. graminis*, and *Capnodium salicinum* [ibid., xviii, p. 627] on vine leaves and peduncles infested by *Pseudococcus citri*.

Bremer (H.), İşmen (H.), Karel (G.), Özkan (H.), & Özkan (M.). **Beiträge zur Kenntnis der parasitischen Pilze der Türkei. II.** [Contributions to the knowledge of the parasitic fungi of Turkey. II.]—*Rev. Fac. Sci. Univ. Istanbul*, Ser. B, xii, 4, pp. 307–334, 2 figs., 1947.

The following are among the records in this further instalment of the authors' list of Turkish parasitic fungi [cf. *R.A.M.*, xxvi, p. 531]. *Uromyces appendiculatus* was observed on beans (*Phaseolus vulgaris*) and *U. betae* on sugar beet, the latter reported to be of rare occurrence in Turkey. *U. fabae* is injurious chiefly to old broad bean plants; other hosts of the rust are lentil [ibid., xx, p. 136] and vetch [ibid., xix, p. 45]. *U. glycyrrhizae* is widespread on *Glycyrrhiza glabra* [the roots of which furnish the liquorice of commerce] in south west Anatolia. *U. terebinthi* was detected on pistachio nut [ibid., xx, p. 136] and *Pistacia terebinthus*. Clover (*Trifolium repens*) was attacked by *U. trifolii-repentis* [ibid., xxiv, p. 473], the aecidia being produced on the petioles and the teleutospores, 23 to 29 by 17 to 23 μ, on the leaves.

Puccinia allii occurs on *Allium ampeloprasum* [ibid., xix, p. 365]. Since 1938 *P. antirrhini* has repeatedly been observed on *Antirrhinum majus* [ibid., xxvi, pp. 356, 398] in the Izmir and Ankara districts, and it is also reported from Adana. Chicory was infected by *P. cichorii* [ibid., xx, p. 596] (in the uredo stage only). *P. glumarum* attacks wheat and barley, sometimes in epidemic form [ibid., xxiv, p. 359] throughout their range of cultivation. In connexion with a severe outbreak in 1943 an assortment of 40 wheat varieties (all Turkish except two, Heines Club and Janetzkis Early) was tested for resistance to yellow rust. A high degree of resistance was shown by the two German varieties and three native selections, 65/29, 253/29, and 1133; seven others were moderately resistant and 28 very susceptible. Other hosts of the rust in Turkey are *Aegilops cylindrica*, *A. ovata*, *Hordeum murinum*, and rye. *P. graminis* is likewise distributed throughout the country on wheat and barley: of 162 samples examined at the time of the severe epidemic in 1940 [ibid., xxiv, p. 358] 133 were infected. Black rust has also been found on *Agropyron repens*, *Elymus caput-medusae*, *Avena barbata*, and *A. sterilis*. *P. per-*

sistens [ibid., xiv, p. 645; xxii, p. 484; xxv, p. 389] was observed on *Agropyron repens*. Hollyhocks and other Malvaceae were attacked by the ubiquitous *P. malvacearum* [ibid., xxv, p. 234]. Apricot was the preferred host of *P. prunispinosae* in severe outbreaks of rust in the Izmir region, but it also occurs on peach, almond, plum, and (in the pycnidial and aecidial stages) on *Anemone coronaria* [ibid., xxvi, p. 113].

Gymnosporangium confusum has been found on *Crataegus monogyna*, quince, and medlar [ibid., xxiv, p. 376]. *G. sabinae* produces its aecidia and pycnidia on pear [ibid., xxv, p. 493; xxvi, p. 229] and its teleutospores on *Juniperus nana* [*J. communis saxatilis*].

Melampsora allii-populina occurs on poplar (*Populus nigra*) [ibid., xxv, p. 145] throughout the country. *M. lini* caused slight damage to flax at Adana in 1943. *Melampsorella caryophyllacearum* was observed in various localities on *Abies bornmuelleriana* [cf. ibid., xvii, p. 478], this being apparently the first record of the rust from the Near East.

Oats are grown mainly along the west coast, and the losses from loose smut (*Ustilago avenae*) do not, in general, appear to be excessive, though isolated cases of 25 to 30 and 40 to 50 per cent. are on record. Covered smut (*U. levis*) [*U. kolleri*] was also found in most districts in varying proportions. *U. hordei* attacks barley throughout the range of the crop, the reduction in which from this source, however, seldom exceeds 5 per cent. Barley loose smut (*U. nuda*) is less prevalent than the covered form. The damage to wheat from *U. tritici* appears to be inconsiderable. The development of maize smut (*U. zeae*) [*U. maydis*] is influenced by weather conditions, its incidence being higher in wet than in dry seasons. The disease, however, is of no great economic importance. *Panicum miliaceum* and sorghum are attacked by *Sphacelotheca panici-miliacei* [*S. destruens*: ibid., xxiii, p. 481] and *S. sorghi*, respectively.

From the economic standpoint wheat bunt (*Tilletia foetens* [*T. foetida*] and *T. tritici* [*T. caries*]) is undoubtedly the most important fungal disease in Turkey. The predominance of the former over the latter species in the country has already been demonstrated by Gassner [ibid., xviii, p. 302].

Calendula arvensis is a regular host of *Entyloma calendulae* [ibid., xx, p. 119; xxiii, p. 475] in the vicinity of Izmir. *Papaver commutatum* (near to *P. rhoeas*) appears to be a new host of *E. fuscum*, which also occurs on *P. somniferum* [ibid., xx, p. 180]. *E. ranunculi* is always to be found in the spring on *Ficaria grandiflora* [*Ranunculus ficaria*] leaves [cf. ibid., xiv, p. 654; xxv, p. 141]: this seems to be the first record for the Near East. Another smut new to the same region is *Tuburcinia* [*Urocystis*] *colchici* [ibid., xix, p. 195] on garden tulips. *T.* [*U.*] *tritici* has only once been observed (in 1939) on wheat, affecting less than 1 per cent. of the crop.

Twenty-first Annual Report of the Department of Scientific and Industrial Research, New Zealand, 1946–1947.—84 pp., 1947.

In this report [cf. *R.A.M.*, xxvi, p. 229] it is stated that the severe scald induced in Jonathan apples by continuous storage at 35° F. and particularly at 32° was very greatly reduced by initial periods at higher temperatures; the results, however, failed to demonstrate any significant advantage over continuous storage at 38° [cf. ibid., xxv, pp. 1, 121]. Nitrogenous fertilizer increased breakdown and reduced wilt in apples kept in cold storage, except when it was balanced with phosphate and potash.

Paper wraps impregnated with diphenyl [ibid., xxvi, p. 379] were used on half of each of two experimental shipments of oranges from two of the Cook Islands. The wraps proved extremely economical in reducing losses from fungal rots [unspecified], especially after the fruit had been held subsequently for a period in New Zealand.

Of three sprays used in a field experiment Bordeaux mixture (1–2–50) alone gave adequate control of plum bacterial spot [*Xanthomonas pruni*: ibid., xxiii, p. 474; xxiv, p. 375]. Apple mosaic [ibid., xxv, p. 304] is widespread and was shown to be due to a bud-transmitted virus. Lemon shellbark was ascertained to be caused by *Diaporthe citri* [ibid., xxvi, p. 394].

In the report of the Grasslands Division (p. 76) it is stated that in breeding work against rye grass [*Lolium* spp.] blind seed disease [*Phialea temulenta*: ibid., xxvi, p. 549], resistant plants have been obtained from F_2 progenies of crosses between resistant and pedigree plants; they are, however, not as good as the pedigree parents. Further generations of crossing to plants of pedigree type will be required in order to obtain resistant strains similar in other respects to the pedigree strains. Preliminary investigations with rye grass grown in pots under glass indicated that certain dusts or sprays applied at blossoming may, perhaps, give control of blind seed disease.

In the report of the Plant Diseases Division (p. 77) it is stated that the tree tomato [*Cyphomandra betacea*] mosaic is widely distributed throughout the localities where this host is grown. The evidence suggests that three viruses may be involved [cf. ibid., xxvi, p. 174], all transmitted by experimental inoculation and all with a wide but differing host range among solanaceous plants. Two strains are insect-transmitted. None is seed-borne. Rhubarb mosaic [cf. ibid., xxi, p. 2] was artificially transmitted from rhubarb to dock [*Rumex* sp.] and from dock to dock by inoculation and by aphids, though attempts to transmit the disease back to rhubarb by insects or inoculations failed. Lettuce mosaic [ibid., xxv, pp. 291, 492] is prevalent in the Auckland and Hutt Valley commercial areas; the virus is seed-borne and transmissible by artificial inoculation. Of 14 varieties of pumpkin, marrow, squash, and cucumber tested, seven were resistant to cucumber mosaic [virus: ibid., xxv, pp. 92, 492].

Three and four applications of Bordeaux mixture and copper carbonate gave satisfactory control of bean [*Phaseolus vulgaris*] halo blight [*Pseudomonas medicaginis* var. *phaseolicola*: ibid., xxv, pp. 479, 483; xxvi, pp. 41, 180] under field conditions, and work is in progress on the selection of three promising resistant varieties. Four applications of Bordeaux mixture (3–4–50) reduced passion fruit grease spot [*Phytomonas passiflorae*: ibid., xxvi, p. 231] to 2·3 per cent. and gave almost complete control of brown spot [*Alternaria passiflorae*: loc. cit.: see also ibid., xxv, p. 100].

Evidence was obtained that the chief source of perpetuation of maize head smut [*Sphacelotheca reiliana*: ibid., xxv, p. 364] is from infected soils, and there may be slight seed infection.

In comparative spraying tests against *Septoria* spot of celery [*S. apii*] cuprox, coppesan, copper Sandoz, and dithane gave as good control as Bordeaux mixture; dithane caused no injury and left no visible residue. In tests against broad bean rust [*Uromyces fabae*: ibid., xxvi, pp. 41, 110], dithane, phygon, fermate, and T.M.T. were as effective as the standard spray, lime-sulphur plus colloidal sulphur.

In studies on various new chemicals likely to be of value in proofing fabrics against fungal and bacterial attack, two plastic resins (eronel O.S. and firefoil) and cadmium naphthenate were tested against *Stachybotrys atra* [cf. ibid., xxvi, pp. 231, 252]; no reduction of tensile strength occurred in plastic resin test strips, but significant breakdown developed in those treated with cadmium naphthenate.

Annual Report, Cawthron Institute, Nelson, New Zealand, 1946–7.—43 pp., [1947].

In this report [cf. *R.A.M.*, xxvi, p. 232] it is stated that during the period under review further analyses of individual apple leaves were made at the Cawthron Institute, New Zealand, to determine their magnesium and potassium contents, the results of which confirmed the data reported in earlier years [cf. ibid., xxvi,

p. 342]. Following observations made the season before that some of the original treatments with magnesium compounds were not continuing to keep magnesium deficiency symptoms in check, further dressings were applied in the early spring of 1946. In 1946–7 in the experimental areas at Tasman untreated Cox's Orange and Sturmer trees were showing severe symptoms, but very satisfactory leaf scorch control was evident where fresh applications of magnesium compounds had been given. Epsom salts [magnesium sulphate] did not give such uniformly good results as magnesium carbonate or ground dolomite. At Braeburn untreated Sturmer trees were nearly dead, while all the magnesium-treated trees were in very good condition [ibid., xxvi, p. 230]; in this locality trees given 24 lb. ground limestone in 1939 were now in a better condition than untreated trees, though for some years after the application they had shown more severe leaf blotch and defoliation than the untreated. On Jonathan trees even 3½ lb. magnesium sulphate per tree had given a fairly satisfactory response and ground dolomite (12 lb. per tree) had effectively prevented defoliation and leaf blotch.

When 1 per cent. elgetol [loc. cit.] was used as a ground spray in the first half of September on the dead leaves of Glou Morceau pears and Dougherty apples, varieties susceptible to black spot [scab: *Venturia pirina* and *V. inaequalis*, respectively], 90 per cent. of the pear fruits were subsequently clean (as against 72 per cent. of the controls) and 87 per cent. of the apples (76 per cent. of the controls). All the trees received the usual applications of Bordeaux mixture and lime-sulphur during the growing period of the fruit.

When Dreadnought tomatoes were grown in the glasshouse and subjected to various treatments, including steam sterilization, fertilizers and other soil amendments, and different rates of watering, 'cloud' [ibid., xxvi, p. 232] was least apparent in the unsterilized plots. Steam sterilization, and the use of compost or cocoa bean husks, tended to increase the disorder and in experiments over four seasons the heaviest rate of watering caused over three times as much cloud as the lowest, though yields were highest with the heavy rate and lowest with the light.

The use of chloropicrin, sheep manure, and cocoa bean husks greatly reduced tomato 'hard core' [ibid., xxvi, p. 231], reduction being associated with improved growth and yield. Other treatments reducing the condition were treble dose fertilizer, soil steaming, and extra potash and nitrogen.

Tobacco varieties found resistant to black root rot (*Thielaviopsis*) [*basicola*: ibid., xxvi, p. 219; xxvii, p. 47] were Haronova, Harrow Velvet, Kentucky 16, Ky 22, Ky 41A, Ky 52, Xanthia, *Nicotiana sparata*, and *N. rustica*. Three varieties showing good resistance to *Verticillium* wilt [*V. albo-atrum*: ibid., xxiii, p. 475; xxiv, p. 6] were Wills's Harrison's Special, Ambalema [ibid., xxv, p. 476], and Kelly.

Hopkins (J. C. F.). **Annual Report of the Branch of Botany and Plant Pathology for the year ending 31st December, 1946.**—13 pp., Department of Agriculture and Lands, Southern Rhodesia, 1947. [Mimeographed.]

In this report on plant disease work in Southern Rhodesia in 1946 [cf. *R.A.M.*, xxvi, p. 95] it is stated that *Xylobotryum coralloides* was isolated from mine timbers and *Acremoniella atra* from wilted tobacco seedlings.

The most important record of the year was the occurrence of two outbreaks of bacterial wilt (*Xanthomonas solanacearum*) on tobacco [loc. cit.], potatoes, and tomatoes [cf. ibid., xxv, p. 472]. One outbreak occurred where the disease had been reported, but not confirmed, nine years previously. It is possible that more than one strain of the organism is involved, and inoculation tests are continuing. It has been found that Kaffir spinach (*Amaranthus graezicans*), common locally, is a host of the bacterium, while sunn hemp (*Crotalaria juncea*) was susceptible to an isolate

from potato under experimental conditions. The disease was not common on tobacco, but was prevalent on potato and tomato. Isolates from tobacco and tomato both gave positive inoculation results with Bonanza tobacco. Varieties of tobacco resistant to the disease are being grown on affected farms.

Many growers secured better control of tobacco brown spot (*Alternaria longipes*) [ibid., xxv, p. 529]. Field experiments have shown that fertilizers with little or no nitrogen have given leaf of better quality and resistance to brown spot on the heavier types of schist soil. Field trials with copper fungicides gave encouraging results and are being extended.

In trials on Willow Leaf tobacco by A. Young spraying with copper oxychloride against brown spot gave good results, and was better than dusting with copper-lime. The disease developed earliest on plants given a low level of fertilizer. The least infection occurred in plots given a mixture of muriate of potash and super-phosphate at 400 lb. per acre. The cured leaf from these plots was superior in quality to that from others where more disease occurred. Irrespective of fertilizer treatment, more disease was present on second- than on first-year land.

No report was received of any recurrence of *Phytophthora infestans* on potatoes. Potato early blight (*Alternaria solani*), the incidence of which has greatly increased in recent years in certain areas where potato cultivation has been much intensified, was completely controlled by copper fungicides. The first outbreak of powdery mildew (*Erysiphe cichoracearum*) [ibid., xxiii, p. 253; xxiv, p. 471] on field potatoes was recorded. Two crops were severely attacked, and the disease was present on other farms. In most instances infection occurred after flowering, and the effect on yield was small, but the potential danger of the disease was apparent when attacks occurred early.

Sugar-cane smut (*Ustilago scitaminea*) was widespread on the Triangle Estates on C.O. 301; C.O. 281 and 290 displayed marked resistance, and no infection was seen on P.O.J. 2725. The complete eradication of C.O. 301 is advised.

Inspection of commercially grown dahlias revealed no trace of kromnek disease [due to a strain of tomato spotted wilt virus], but mosaic is widespread.

In a study of tobacco barn rot Dr. Bates and Mrs. Pardy found that many cultures of *Rhizopus* spp. isolated from various rotting substrata appeared to be identical with *R. arrhizus* from tobacco [ibid., xviii, p. 632]. This provides further evidence that barn rot is essentially a physiological disease of the curing leaf, the fungus being secondary to autolytic cell breakdown.

[Brief notes on some of the items in this report were published in *Rhod. agric. J.*, xliv, 4, pp. 355–357, 1947.]

Fifty-third Annual Report of the Idaho Agricultural Experiment Station for the year ending 30th June, 1946.—*Bull. Ida. agric. Exp. Sta.* 268, 60 pp., 5 figs., 1946.

The plant diseases section (pp. 34–37) of this report [cf. *R.A.M.*, xxv, p. 205] contains, *inter alia*, the following items of phytopathological interest. In further investigations on bacterial ring rot of potatoes [*Corynebacterium sepedonicum*: ibid., xxvii, pp. 37–39] J. M. Raeder found that when 1 per cent. of planted potato tubers were diseased, the crop showed 22 per cent. infected hills, and 9 per cent. diseased tubers resulted in 72 per cent. infected hills. Complete control of *C. sepedonicum* was achieved by the sterilization of the rotating cutting knife by boiling water. Of 354 hills examined 24 per cent. showed no symptoms during the growing stage, but when tested by the Gram stain were found to be infected.

G. Ken Knight and R. D. Watson report promising results in their work on breeding tomato plants resistant to [beet] curly top virus [ibid., xxvi, p. 530]; one selected line, showing as many as 50 per cent. of the plants unaffected, should form an excellent basis for breeding.

R. D. Watson and L. L. Dean record the release of a new Large Pinto bean

Phaseolus vulgaris] resistant to bean mosaic and beet curly-top viruses [ibid., xxvii, p. 56], for increase to a few growers. It is from a cross between the susceptible common Pinto and the resistant Red Mexican U.I. 34.

In the potato research section (pp. 52–55), L. W. Nielsen describes a disease occurring in many localities in southern and eastern Idaho, where it is known as 'early dying', the causal organism of which was identified as *Verticillium albo-atrum* [ibid., xxii, p. 219]. All potato plants grown in naturally and artificially infested soil developed the characteristic symptoms. Pontiac, Sebago, Kasota, Menominee, and Llewellyn plants developed chlorosis and wilting 10 to 14 days after inoculation.

The same author reports investigations into the cause of potato seed piece decay [ibid., xxvii, p. 37], which affected many sets in 1945, even though planted soon after cutting. As the time of storage was increased the greater was the incidence of decay. Isolations from seed pieces representing all stages of decay showed that a *Fusarium* sp. of the *Martiella* section [ibid., xxv, p. 331] was the principal pathogen. Its infectivity was confirmed in tuber inoculation tests and when spore suspensions were placed on cut seed piece surfaces. It did not affect the aerial parts of the plants. Preliminary experiments indicate that both low temperature (45° to 50° F.) and humidity encourage seed piece decay by retarding suberization. *Fusarium* seed piece decay is occasionally followed by the black leg bacterium *Erwinia phytophthora*] [ibid., xxv, p. 414] causing a high percentage of infection in the new crop.

Fifty-eighth Annual Report of Purdue University Agricultural Experiment Station, Lafayette, Indiana, for the year ending June 30th, 1945.—102 pp., 6 figs., 1945. [Received 1947.]

The following are among the items of phytopathological interest in this report (cf. *R.A.M.*, xxvi, p. 287]. In the section on plant pathology (pp. 39–46) G. B. Cummins, describing further breeding work with tomatoes for resistance to *Septoria lycopersici* [loc. cit.], states that the more promising F_2 hybrids from *Lycopersicon hirsutum*, some of which are homozygous for resistance, were back crossed to Rutgers. In addition, 200 field-grown second back-cross progenies from the F_1 were again back crossed to Rutgers and the F_2 progenies segregated a high percentage of resistant plants. All hybrid lines used are homozygous for red fruit colour and satisfactory increases in fruit size are being obtained.

R. W. Samson and R. M. Caldwell have developed 11 promising canning tomato lines highly resistant to *Fusarium* wilt [*F. bulbigenum* var. *lycopersici*: ibid., xxvi, p. 176 and loc. cit.] from crosses between a line of Red Currant (*L. pimpinellifolium*) and Indiana Baltimore and Rutgers. All heavily outyield Indiana Baltimore and Rutgers in infested soil in Indiana.

R. W. Samson states that five unnamed potato seedlings and varieties, three supplied by the United States Department of Agriculture and two developed locally, produced crops free from scab [*Actinomyces scabies*: loc. cit. ibid., xxvii, p. 85], though the Katahdin controls were severely affected. All five appear to derive their resistance from Hindenburg or Richter's Jubel [ibid., xxvi, p. 77]. One, U.S.D.S. 528–170, has given higher yields of scab-free, marketable potatoes in scab-infested muck soils in Indiana than any material yet tried. An Indiana scab-susceptible seedling, No. 451, has invariably outyielded Katahdin both on muck and upland soils in northern Indiana and may have possibilities as a home-garden potato in acid soils. Three different lots of Indiana muck-grown seed potatoes treated with a wettable sulphur dip [ibid., xxvi, p. 441] yielded 64 per cent. scab-free potatoes while the untreated portions gave only 50 per cent.

R. M. Caldwell and L. E. Compton state that winter barley varieties adapted to Indiana are susceptible to loose smut [*Ustilago nuda*]. Artificial inoculations

showed that several unadapted varieties were resistant to the smut locally and these have been hybridized with adapted varieties.

In a study of the nature of the inheritance of resistance to wheat rosette mosaic virus [ibid., xxiv, p. 407; xxv, p. 368; xxvi, p. 327], using the F_1, F_2, and F_3 generations of crosses between C.I. 11850 (resistant) and the susceptible wheats Sel. 45–1634–1 and Sel. 45–1834–1, evidence was obtained that resistance was controlled by a single dominant gene.

A. J. Ullstrup found that several inbred lines of maize showed high resistance to leaf blight (*Helminthosporium turcicum*) [ibid., xxv, pp. 492, 556], including Oh. 04, 03, 02, and Mo. 21A, the last-named being by far the best in this respect.

A. M. Brunson, investigating maize seed stored since 1939 under various conditions [cf. ibid., xxiii, p. 100; xxiv, p. 364], ascertained that seed dried to 7 per cent. moisture maintained germination better than that with 11 per cent., while that with 15 per cent. deteriorated rapidly unless kept in cold storage.

Studies were continued on the relation between maturity and susceptibility to maize ear rot (*Diplodia zeae*) [ibid., xxiii, p. 288; xxiv, p. 499]. The series inoculated (by spraying a spore suspension over each ear) on 7th August showed higher incidence and greater severity than that inoculated on 4th September.

Experimental evidence indicated that spergon and arasan are at least equal to semesan jr and barbak C in controlling maize seedling diseases.

R. M. Caldwell, J. H. Lefforge, and N. K. Ellis made crosses between a fertile polyploid of *Mentha piperita* and *M. crispa*, *M. spicata*, and *M. arvensis piperascens*. The F_1 plants were tested in the greenhouse for resistance to anthracnose [*Sphaceloma menthae*: ibid., xxiii, p. 288] and rust [*Puccinia menthae*: ibid., xxv, p. 232] and the resistant ones grown in the field, where 124 clones were selected for further test on muck soils. Some of these clones were highly vigorous on the muck soils, gave the peppermint type of oil, and were promising in oil yield.

Fifty-ninth Annual Report of Purdue University Agricultural Experiment Station, Lafayette, Indiana, for the period ending June 30, 1946.—86 pp., 13 figs., 1946. [Received 1947.]

This report [cf. preceding abstract] contains among others the following items of phytopathological interest.

R. M. Caldwell and L. E. Compton state that wheat varieties highly resistant to leaf [brown] rust [*Puccinia triticina*: *R.A.M.*, xxvi, pp. 239, 293, 337, 385] ten years ago in Indiana were severely attacked in 1944 and 1945 by new races of the fungus. For example, Wabash is now affected by race 76, which predominated locally in 1945–6. New varieties are, however, being perfected by combining the resistance of Wabash with that of Hungarian, resistant to race 76. As a result of this work, a number of promising soft red winter wheats have been produced which are almost immune [see below, p. 128].

G. B. Cummins, R. W. Samson, and R. M. Caldwell state that tomato plants known to be resistant to *Septoria lycopersici* [see preceding abstract] from the F_2 back-cross generation, and back crossed a second time with Rutgers, showed 18, with fruit averaging nearly 5 oz. in weight, which were selected for further observation.

In work by R. W. Samson, G. B. Cummins, and R. M. Caldwell at least 16 strains of tomatoes resistant to wilt [*Fusarium bulbigenum* var. *lycopersici*: loc. cit.] have been developed to the stage where extensive yield and adaptation tests are necessary. All have survived severe greenhouse and field tests for resistance, and all give high yields.

R. W. Samson reports that 102 individual tomato-plant selections of promising commercial lines from the 1946 *Fusarium* wilt breeding plots were tested for resis-

tance to a strain of the organism (F_5) obtained from Dr. F. S. Wellman and originating from Missouri. Eighty-eight appear to be homozygous for resistance to the Wellman strain, 14 per cent. heterozygous, and none completely susceptible. They were also tested with another Missouri strain (A–1–3) from Dr. C. M. Tucker. This strain is pathogenic to some *Lycopersicon pimpinellifolium* plants completely resistant to the Wellman strain. Thirteen appear to be homozygous for resistance, 69 heterozygous, and 19 completely susceptible; some of these 19 lines are homozygous for resistance to the Wellman strain.

It appears to be possible to select lines of *L. pimpinellifolium* which are homozygous for resistance to the Wellman strain and homozygous for susceptibility to A–1–3, and vice versa. These results confirm work in Ohio and Missouri indicating that physiologic specialization exists in *F. bulbigenum* var. *lycopersici* [cf. ibid., xxii, p. 331].

In an experiment by R. W. Samson and J. D. Hartman 12 plots of canning tomatoes, scattered over central and southern Indiana, were sprayed four times with Bordeaux mixture against unspecified leaf-destroying and fruit-rotting diseases during the summer of 1945. From the results obtained it would appear that spraying is not profitable when applied to early plantings of tomatoes.

The potato variety Menominee will produce high yields free from scab [*Actinomyces scabies*: see preceding abstract] in infected muck soils in Indiana. Several other seedlings have been found almost completely resistant in infected muck soils in Indiana, and some appear to be even more promising than Menominee. From experiments with seed potatoes from different sources, treated against tuber-borne scab, it appears that seed potatoes from Indiana muck soils carry more tuber-borne scab than northern certified seed and they should, therefore, be disinfected. In these tests the tuber treatments did not give complete control, and the treated muck-grown potatoes did not generally yield as many scab-free potatoes as either the treated or untreated potatoes from mineral soils.

One of the treatments consisted in dipping the potatoes momentarily in a suspension of 2 lb. wettable sulphur in 1 gal. water; this treatment has appeared to equal any other standard treatment so far tested in Indiana. That better control may, however, be possible by increasing the quantity of sulphur was indicated by a test in mineral soil in 1945. Some affected Sequoia potatoes were dipped in the sulphur suspension, only a thin film of which adhered. Others were moistened and rolled in fine dusting sulphur, which gave a heavy coating. Both treatments gave excellent control, the heavier dosage being much the more effective, but even that failed to give complete control by 23 per cent. It is probable that the soil was almost free from scab, and that most of the disease came from the infected tubers. Further work is in progress on the question of suitable dosages of sulphur. Meantime, only the dip method should be used, and only on whole, uncut seed potatoes from Indiana muck soils.

R. R. Mulvey and G. O. Mott state that Buffalo lucerne [ibid., xxiv, p. 511], selected for yielding ability and resistance to wilt [*Corynebacterium insidiosum*: ibid., xxvi, p. 8; xxvii, p. 24], still maintained about 90 per cent. of its original stand at the end of its third year and there was very little loss during the fourth, 1945. Buffalo promises to be one of the outstanding varieties for Indiana.

C. L. Burkholder and T. E. Heinton state that the cost of spray applications in Indiana orchards using stationary pumping plants was about one-third less than with portable ones. On rough, hilly ground portable spraying is difficult, dangerous, and causes serious soil erosion. Control of insects and diseases was about the same by the two methods. Depreciation on a stationary plant was about $6\frac{1}{2}$ per cent. per annum as compared with at least twice that for portable apparatus, but the former method is at present handicapped by lack of hose pullers.

Fifty-seventh Annual Report of the University of Maryland Agricultural Experiment Station, 1943–44.—40 pp., 3 figs., (?) 1944.

The following items of interest are in this report. The potato seedling B 247, resistant to late blight [*Phytophthora infestans*: *R.A.M.*, xxvii, p. 85], was named Potomac. On unsprayed plots it had few blighted tubers and yielded 198 bush. per acre of U.S. No. 1 potatoes, its maximum yield being 638 bush. per acre.

During 1943 about 50,000 Temple strawberry plants resistant to red stele [red core (*Phytophthora fragariae*): ibid., xxvii, p. 28] were made available for distribution. Other resistant unnamed varieties are being tested and multiplied for production.

Costa Neto (J. P. da). **Fungos do Rio Grande do Sul observados nos anos de 1940–41.** [Fungi of Rio Grande do Sul observed in the years 1940–41.]—*Bol. Secret. Agric., Pôrto Alegre*, 99, 11 pp., 1943. [English summary. Received November, 1947.]

Among the fungi collected in Rio Grande do Sul, Brazil, in 1940–1 [cf. next abstract] were *Puccinia psidii* [*R.A.M.*, xxv, p. 141] on *Campomansia aurea*, *Ascochyta cannae* on *Canna coccinea* [cf. ibid., xxii, p. 153], *Haplographium manihoticola* and *Oidium manihotis* on cassava [ibid., xxiv, p. 489], *Tranzschelia punctata* [*P. pruni-spinosae*] on apricot, *Venturia cerasi* on cherry, *Physalospora obtusa* on peach and apple, and *Claviceps purpurea* on *Setaria geniculata*.

Costa Neto (J. P. da). **Parasitos de plantas cultivadas no Rio Grande do Sul.** [Parasites of cultivated plants in Rio Grande do Sul.]—*Bol. Secret. Agric., Pôrto Alegre*, Ser. A, 121, 16 pp., 5 pl., 1 fig., 1947. [English summary.]

Included in this list of pathogens of cultivated plants in Rio Grande do Sul, Brazil [cf. preceding abstract], are *Phytomonas* [*Xanthomonas*] *phaseoli* on bean (*Phaseolus vulgaris*), *Peronospora destructor* [cf. *R.A.M.*, xxv, p. 579] and *Botrytis allii* on onion [ibid., xxv, p. 90], *Podosphaera leucotricha* on apple, *Gibberella fujikuroi* on maize, and *G. saubinetii* [*G. zeae*] on the same host, wheat, cassava, and fig.

Rapport pour les exercices 1944 et 1945. [Report for the years 1944 and 1945.]—*Publ. Inst. nat. Étud. agron. Congo belge*, 191 pp., 1947.

In the section of this report dealing with plant disease work in the Belgian Congo during the period under review [cf. *R.A.M.*, xxv, pp. 28, 154], R. L. Steyaert and J. Moureau state that in further studies at Bambesa on resistance to *Fusarium vasinfectum* [ibid., xxvi, p. 235], using 40 selected lines and varieties of cotton infected artificially with the pathogen, it was found that Arkansas 17 and B.P. 52 were highly resistant, and Stoneville 5A, Stoneville O 4, Gar. 32 and 33, and Lubarika 34 showed good resistance. Two hundred and thirty-five plants were selected for outstanding resistance.

During a systematic survey of the cotton-growing areas of Bambesa and Dingila in 1945, visits were made to 10 per cent. of the fields and 100 foci of infection by *F. vasinfectum* were discovered [loc. cit.]. A less systematic inspection at Titule revealed 25 foci and another near Yandongi (Ubangi) showed about 30 fields to be affected, half of them very seriously. The disease was also observed at Bozene (Ubangi).

The phytopathological service records a rotting of the peduncles and bases of bananas at Ruanda caused by *Chlamydomyces palmarum* [ibid., xxii, p. 416]; the disease did not appear to be of economic importance. Citrus at Kisamba (Lomami) and Kamina was affected by a condition resembling concentric ring blotch [ibid., xvi, p. 378], while in the latter locality and also at Kurukwata (Bas-Ituri) the same

st was rather seriously infected by *Sphaceloma fawcettii* [*Elsinoe fawcetti*]; citrus uits developed rotting due to *Phytophthora citrophthora* in Ruanda, where *plodia natalensis* was also present.

The Sabanero wheat variety, introduced at Lubero, appears to be resistant to *uccinia graminis*. At Yangambi and Lola foot rot of *Hevea* rubber was caused, parently, by *Armillaria mellea*. *Plenodomus destruens* [ibid., xxvi, p. 145] was ain reported on sweet potato from Kivu.

Potatoes near Nioka were very severely attacked by *Phytophthora infestans* id., xxvi, p. 465]. Damping-off of *Cinchona* seedlings caused by *Rhizoctonia orticium*] *solani* [ibid., xxiii, p. 431] and a *Pythium* sp. was widespread at Kivu, d was also reported from Butembo.

stschrift zur Feier des achtzigsten Geburtstags von Geh. Reg.-Rat. Prof. Dr. h. c. Otto Appel, Präsident der Biologischen Reichsanstalt i. R. am 19 Mai, 1947. [Festival publication in honour of the eightieth birthday of Prof. Dr. Otto Appel, P.C., President of the Biological Institute (retired) on 19th May, 1947.]—68 pp., 6 figs., Biologische Zentralanstalt für Land- und Forstwirtschaft in Berlin-Dahlem, 1947.

The following are included among the 31 contributions to this anniversary blication: (1) principles of gall formation and general phytopathology, by E. ERTH (pp. 3–5); (2) the application of organic substances as fungicides, by HANNA WESTERDIJK (p. 9); (3) the dependence of the virulence and other proper-s of pathogenic bacteria, as well as the results of inoculations, on meteorological nditions (preliminary note), by H. BORTELS (pp. 10–12) [cf. *R.A.M.*, xxii, p. 2]; (4) a method for the quantitative determination of the growth of parasitic saprophytic fungi in natural soil, by G. WINTER (dealing with *Ophiobolus uminis* on wheat) [cf. ibid., xxiv, p. 94] (pp. 12–15); (5) studies on redox [oxida-n-reduction] potentials of tissue paste suspensions and expressed juices of plant rts, by H. WARTENBERG (in connexion with potato viruses) [cf. ibid., xvi, p. 705] p. 16–18); (6) notes on the work of the Plant Protection Service of the Province of xony during the years 1920–32, by K. R. MÜLLER (pp. 19–20); (7) plant protec-n and agriculture, by F. W. MAIER-BODE (pp. 20–21); (8) contribution to plant otection statistics, by M. KLEMM [cf. *R.A.M.*, xxv, p. 226] (pp. 23–26); (9) the ntrol of virus degeneration diseases of the potato, by K. STÖRMER and INGEBORG N BERNUTH [cf. ibid., xxiii, p. 406] (pp. 27–29); (10) the reaction of plants to us infections: test of a system of resistance phenomena, with special reference to tato breeding, by E. KÖHLER (pp. 30–31); (11) spraying experiments on potatoes the control of virus-carrying aphids, by K. HEINZE [cf. ibid., xx, pp. 20, 487] p. 31–34); (12) contribution to the timely detection of the potato leaf roll disease staining of the phloem, by O. BODE [cf. ibid., ii, p. 569; xi, p. 121]; (13) recent vestigations on the differences in resistance of German potato varieties to cterium *phytophthorum* [*Erwinia phytophthora*: ibid., xvi, p. 708] (preliminary te), by C. STAPP (pp. 36–37); (14) the small tuber potato sickness and a further rmination anomaly of the potato tuber, by K. O. MÜLLER (pp. 37–39); (15) the bstriction' of poppy plants, by H. PAPE (pp. 47–49); (16) disinfection experi-nts with *Helminthosporium*-infected poppy seeds, by E. REINMUTH [ibid., xxiii, 120] (pp. 49–51); (17) vine pests destroy a century-old vine, by H. ZILLIG (pp. –52); (18) studies on the host range of *Colletotrichum trifolii*, by M. KLINKOWSKI d H. RICHTER [ibid., xiii, p. 382; xxv, p. 455] (pp. 56–58); (19) the brown rot of ver caused by *Thielavia* [*Thielaviopsis*] *basicola*, its dependence on environ-ental factors, and its relation to phenomena of antagonism in the Leguminosae, K. BÖNING [ibid., xv, p. 536] (pp. 60–63); (20) inoculation experiments with *Phytophthora* from apricot fruit rot, by L. QUANTZ [cf. ibid., xvii, p. 253] (pp. 63–); (21) the procurement of fungus-free flax darnel seeds (preliminary note), by

G. Bredemann [ibid., xii, p. 778] (p. 65); and (22) recent observations and investigations on the panicle smut of tall oat grass, by E. Mühle [cf. ibid., xviii, p. 34; xx, p. 526; xxvi, p. 266] (pp. 66–67).

The following are some of the many interesting results of original research embodied in these papers. Further experiments on the relation of the pathogenicity of bacteria to meteorological conditions (3), involving inoculations, e.g., with *E. phytophthora* on potato, *Pseudomonas tabacum* on tobacco, and *P. medicaginis* var. *phaseolicola* on beans [*Phaseolus vulgaris*], emphasized the complexity of the problem. It was clear, however, that a sudden rise from low to high barometric pressure tends to depress the vital functions of the highly developed host and to enhance the virulence of the primitive parasite, while conversely, the latter readily succumbs to an abrupt fall from high to low pressure.

The results of experiments at a potato-breeding station (9) in northern Hanover lent unequivocal support to the view that viruses, rather than adverse ecological factors, are the primary cause of degeneration. Further evidence was forthcoming of the importance of peach-trees as overwintering places of the peach aphid [*Myzus persicae*], and a strong plea, based on the fact that potatoes account for 25 per cent. of the national food-supply, is made for the drastic elimination of peach orchards from the potato-breeding regions of western Germany. Of great economic consequence is the discovery, in connexion with these studies, that healthy seed can be produced in central Germany at elevations of 270 m. and upwards; these should be intensively utilized to replace the lost territory of the east, which formerly supplied 87 per cent. of the certified planting material. An indispensable precaution is the early selection of individual plants free from virus infection (leaf roll in these experiments) and their use as clones for the production of a sound progeny.

The detection of incipient leaf roll has been greatly facilitated by the staining of the phloem (12). Basal stem sections are immersed for one to two minutes in a 1 in 20,000 solution of diamantfuchsin DAB 6 at pH 4·5 with a phosphate buffer which imparts to the diseased or necrotic phloem cells a light-red to dark-carmine tinge. Examined through the fluorescence microscope, the xylem, cambium, and bast fibres of sections dipped for one to two minutes in rhodamin B and coriphosphin (both at 1 in 20,000) at pH 2 are of a clear, pale yellow, while the necroses in the phloem are reddish-brown. The method is applicable to highly tolerant varieties in which severe leaf roll is not accompanied by typical changes in the phloem, and yielded valuable information in tests on the resistance to the disease of 14 varieties in the official list.

On the basis of the latest tests in 1943 and 1944, seven potato varieties are classed as resistant to strains 14 and 43 of *E. phytophthora* (13), viz., Carnea, Flava, Johanna, Prisca, Robusta, Sickingen, and Stärkeragis, 18 as fairly resistant, 21 as susceptible, 15 as highly susceptible, and four as very highly susceptible.

Fusarium, *Alternaria*, and *Cladosporium* spp. were the fungi most frequently isolated from the blackened stumps of opium poppy plants abstricted at the root collar (15); *Pleospora calvescens* developed only once but is thought likely to be the primary agent of the disease.

In poppy seed disinfection experiments in quartz sand for the control of *P. calvescens* (10) a high seed-bed temperature (20° C.) was found to favour the pathogen which reached an incidence of 16·5 per cent. in the untreated beds as compared with 3 in the corresponding series at 13° to 16°. Ceresan, abavit, and germisan gave effective control, a dosage of 3 gm. per kg. seed sufficing except in cases of very heavy infestation, when an increase to 6 gm. is advisable. In a parallel series of tests in (*a*) well-rotted compost heated for an hour at 150° and (*b*) unheated the diseased seedlings in the latter numbered scarcely a third of those in the former, indicating the presence of antagonists of *P. calvescens* in the untreated compost.

By means of inoculation experiments, supplemented in some cases by field servations, the host range of *Colletotrichum trifolii* (18) has been extended to clude several species of lupin, *Trigonella coerulea* and *T. cretica*, *Hosackia americana*, *Anthyllis vulneraria*, *Lotus corniculatus*, *L. uliginosus*, *Galega officinalis*, *Coronilla varia*, *Onobrychis sativa*, vetch, broad bean, and other *Vicia* spp., *Cicer arietinum*, lentil, and *Lathyrus* spp.

Investigations on the clover root rot caused by *Thielaviopsis basicola* (19) have been in progress at Munich since 1935. The disease was studied in relation to various saphic factors and inoculation tests were carried out to determine the reactions various legumes and the possibility of physiologic specialization within the ngus. Of the clovers tested, the white was the most, and crimson the least, sceptible, alsike and red being intermediate. Blue lupins and dwarf beans *Phaseolus vulgaris*] were very severely attacked, yellow lupins and soy-beans ere slightly less susceptible, lucerne, yellow clover [*Medicago lupulina*], and sainin [*O. sativa*] were consistently more resistant, while field peas, vetch, tufted tch [*V. villosa*], and Hungarian vetch [*V. pannonica*] sustained negligible mage. Except in respect of yellow lupin, little evidence of physiologic specialization was forthcoming, and owing to war conditions the matter could not be ursued.

The morphological characters of a *Phytophthora* isolated on malt extract agar om a brown rot of apricots (20) agreed with those of *P. cactorum*. The typical mptoms of the disease developed in inoculation experiments on wounded tomatoes d apples (16 varieties) and on injured and intact peaches.

The following procedure is recommended for the decontamination of *Lolium motum* seed (21) from *Chaetomium kunzeanum*, alleged to carry a toxic principle using disease in livestock: three hours' pre-soaking at 20° and 10 to 12 minutes' mmersion at 53°, followed by a plunge in cold water and drying in a thin layer at a aximum of 30°. For treatments in bulk a preliminary warming at 45° should ecede the immersion. Double the normal quantity (40 gm. per 10 sq. m. with 20 n. between the rows) of seed should be sown to offset a possible reduction of rminative capacity.

Three types of panicle smut (*Ustilago perennans*) of tall oat grass (*Arrhenatherum utius*) (22) were differentiated. In type I the sterile and often also the flowering umes remained intact, while each floret enclosed a spore mass initially enveloped a fine membrane. Type II was marked by the entire absence of paleae and partial ss of the flowering glumes, the sterile being largely preserved. The floral parts stroyed by the smut mostly formed a substantial mass, crumbling readily under essure from the fingers. In type III floral disorganization was usually so far lvanced that only remnants of the glumes were recognizable, while the inflorescence self had lost much of its panicle shape and supported the spore masses almost rectly on its main axis. Almost perfect control of the smut, both in naturally ntaminated and inoculated seed, was effected in laboratory tests by dusting with rmisan.

nnual Report of the Agricultural Experiment Station, Florida, for the year ending June 30, 1946.—206+vi pp., 7 figs., 2 diags., 4 graphs, [? 1947].

In the plant pathology section (pp. 83–89) of this report [cf. *R.A.M.*, xxvi, p. 146] rther investigations by E. West into the host relations and factors affecting the owth and parasitism of *Sclerotium rolfsii* [ibid., xxvi, p. 246] revealed that lupin eds germinated well when sown 12 weeks after infested soil had been treated with lcium cyanamide, uramon, uramon+cyanamide, uramon+lime, or ceresan susnsion, all treatments giving equally good disease control.

A series of greenhouse tests with inoculated soil was carried out by A. N. Brooks d W. B. Tisdale to see the effect of vegetable matter and soil fumigants on seed

decay and post-emergence damping-off caused by *Rhizoctonia* sp., using cabbage and lettuce as test crops. Seed treatments with a 25 per cent. arasan gave highly significant increases in emergence which was practically the same for all soil treatments. Although cabbage-seed emergence improved with the progressive decomposition of vegetable matter in the soil, emergence of both cabbage and lettuce was highest where no addition had been made. All isolations from the lesions of diseased cabbage yielded only *Trichoderma* sp., the same species being obtained from the lesions on diseased Fordhook Lima beans [*Phaseolus lunatus*] grown indoors in infested soil in 1945. In this experiment the yield was significantly higher on land where the vegetation was turned under early than where it was turned under just before planting the seed. In a further experiment in 1946, in which Lima beans were field-grown in soil containing fully and partially rotted plant refuse, germination ran higher than 80 per cent. in both cases, the lesions on diseased plants again yielding only *Trichoderma* sp.

In experiments on Norfolk sandy loam, using various soil fumigants on cabbage, lettuce, and tomato, 1 lb. uramon mixed with ½ lb. calcium cyanamide or with ½ lb. hydrated lime gave the greatest consistent increase in crop weight. Some of the fumigants seemed to stimulate the activity of *Rhizoctonia* sp. with resultant decreases in emergence and stand.

P. Decker, in further breeding work with eggplants for resistance to blight (*Phomopsis*) [*vexans*], made 75 selections from the 1945 hybrids.

E. West, from a large number of diseased *Camellia* spp. received, reports leaf gall (*Exobasidium camelliae*) [ibid., xxvi, p. 172], damping-off (*Rhizoctonia* sp.) of cuttings, leaf spotting (*Phyllosticta* [? *camelliae*], *Pestalotia* sp. [cf. ibid., xxvi, p. 330], and *Gloeosporium* sp.), ring spot (a virus disease) [cf. ibid., xxiii, p. 43] and algal spot (*Cephaleuros virescens* [*C. mycoidea*: ibid., iv, p. 510]. The fungi most consistently isolated from die-back specimens [ibid., xxv, p. 561] were *Diplodia*, *Phomopsis*, and *Gloeosporium* spp. in that order.

In the course of their lupin investigations P. Decker and R. C. Bond report that of various soil treatments only chloropicrin (300 lb. per acre) increased both the stand and green weight of blue lupins. *Sclerotium rolfsii*, *Rhizoctonia* [ibid., xxvi, p. 562], *Fusarium*, and *Botrytis* spp. [including *B. cinerea*: ibid., xxii, p. 360; xxv, p. 303] were observed in the field but only the last-named seemed to be more abundant than last season. Sclerotia of a *Sclerotinia* sp. were found inside the stems and seed pods of diseased plants in a few affected fields; in localized areas 85 per cent. of the plants were killed. The seed crop was materially reduced by an *Erysiphe* sp. [? *E. polygoni*: ibid., xxv, p. 439] prematurely killing some plants.

Knowles (P. F.). **Cereal variety tests.**—*Pr. Bull. Univ. Alberta*, xxxii, 1, pp. 7–10, 1947.

After reviewing the requirements for adequate comparative testing of new cereal varieties the author gives a tabulated account of the results of such tests carried out at various centres in Alberta during recent years. Among the outstanding varieties may be mentioned Redman wheat, resistant to stem [black] rust [*Puccinia graminis*] and leaf [brown] rust [*P. triticina*: *R.A.M.*, xxvii, p. 71] recently released by the Dominion Rust Research Laboratory, Winnipeg; Exeter and Brighton oat varieties resistant to *P. graminis* and smuts [*Ustilago avenae* and *U. kolleri*: ibid., xxvii, p. 15], the former from the Dominion Rust Laboratory and the latter from the Central Experimental Farm, Ottawa.

Titan barley, highly resistant to loose smut [*U. nuda*: loc. cit.], was produced by the University of Alberta.

Royal flax is recorded as resistant to wilt [*Fusarium lini*: ibid., xxvi, p. 489] and rust [*Melampsora lini*: loc. cit.] and superior to Redwing in southern areas of Alberta.

ASTHAM (A.) & BRETT (C. C.). **The Official Seed Testing Station for England and Wales. Twenty-third to twenty-seventh Annual Reports covering the period 1st August, 1939–31st July, 1944.**—*J. nat. Inst. agric. Bot.*, v, 2, pp. 228–245, 1947.

The routine examination of cereal samples for impurities [cf. *R.A.M.*, xxiv, p. 51] cludes records of the incidence of certain seed-borne diseases on the basis of aked-eye' evidence alone. During the entire period under review the percentage wheat samples containing bunt (*Tilletia caries*) balls was relatively low, but even the figure for 1943–4 (2·1) is equivalent to 287 visibly infected samples out of a tal of 13,670. The amount of barley covered smut (*Ustilago hordei*) declined ogressively during the five years covered by the report, the 1943–4 percentage 1·7 being the lowest for a decade. By 1942–3 rye ergot (*Claviceps purpurea*) had llen to a low level (3·2 per cent.), following a period from 1937 to 1940 during hich the percentages ranged from 20 to 30; in 1943–4 there was a further slight se (7 per cent.). In 1941–2 an attempt was made to determine the extent of *elminthosporium* infection of barley [*H. gramineum*] and oats [*Pyrenophora enae*: ibid., xxv, p. 210] in 100 random samples of either crop, 50 seeds from each eing incubated at 13° C. for a week and the incidence of contamination judged by ore production during this period. The percentages of oats and barley showing infection were 10 and 9, respectively, while 1 and 8, respectively, showed 91 to 00 per cent. Over 50 per cent. infection was present in 24 per cent. of the oat and 7 per cent. of the barley samples.

During the five years the majority of celery seed samples had less than 20 per nt. infection by *Septoria apii* [ibid., xxvi, p. 69; xxvii, p. 59], many having only to 5 and only 2·9 per cent. over 60 per cent. (71–80 in 1943–4). The majority samples were free from *Phoma apiicola* and few or none had more than 5 per nt. infection.

ODENHISER (H. A.) & HURD-KARRER (ANNIE M.). **Evidence of fusion bodies from urediospore germ tubes of cereal rusts on nutrient-solution agar.**—*Phytopathology*, xxxvii, 10, pp. 744–756, 3 figs., 2 graphs, 1947.

At the Plant Industry Station, Beltsville, Maryland, germ-tubes from the uredoores of the cereal rusts, *Puccinia graminis tritici*, *P. triticina*, *P. dispersa*, *P. coronata avenae*, *P. hordei*, and *P. sorghi* [*P. maydis*], grown on agar containing ineral nutrients and dextrose, produced at the tips orange-brown bodies (herein esignated 'fusion bodies') that coalesced with contiguous germ-tubes and with ach other to form networks of hyphae above the level of the agar surface. These odies were at first fluid but later hardened. Fusion between the contents of a body nd those of a contacted hypha were observed. The bodies occasionally produced veral short hyphae; these, except in one instance, were in older cultures conminated by *Rhizopus* and *Alternaria*, by-products from which may have stimuted the hyphal growth.

The maximum numbers of 'fusion bodies' developed on media containing 6 to 8 r cent. dextrose, but the optimum concentration for network formation lay tween 4 and 6 per cent., coinciding with more extensive hyphal production. emperature did not appear to be an important factor in 'fusion body' development which occurred throughout the range favourable for germ-tube production 0° to 25° C.). On the other hand, they were suppressed by daylight and by artifial illumination from Mazda and fluorescent lights, the inhibitory effect of which as traced to the short wave-lengths at the blue end of the spectrum, between 000 and 5,000 Å.

Hyphal networks with 'fusion bodies' on the strands were occasionally observed wheat leaves inoculated with *P. triticina* uredospores.

Wang (H. R.). **Notes on physiologic specialization in leaf rust of Wheat in China.**—*Phytopathology*, xxxvii, 9, pp. 680–681, 1947.

Investigations were initiated in 1940 on the number, distribution, and prevalence in China of the physiologic races of wheat leaf [brown] rust (*Puccinia rubigo-vera tritici*) [*P. triticina*], one of the principal diseases of the crop, especially in the Yangtze River valley [cf. *R.A.M.*, xxv, p. 208]. Only three races, viz., 1, 63, and 123, were identified in 89 collections made in 1940–1 from single uredosori. Of the eight differential varieties tested, only Brevit reacted variably, race 1 inducing infection type 0–2, 63 type 2–3, and 123 type 3–4. The others were resistant to, or immune from, all three races, the distribution of which was fairly general in the south-western provinces. Race 123 appears to predominate, constituting 55·1 per cent. of the collections examined, while the prevalence of 1 and 63 was roughly equal (24·7 and 20·2, respectively).

Caldwell (R. M.) & Compton (L. E.). **Vigo—A new disease resistant Wheat.**—*Bull. Ind. agric. Exp. Sta.* 521, 11 pp., 4 figs., 1947.

As a result of the combined efforts of the Purdue University Agricultural Experiment Station and the United States Department of Agriculture, Vigo (C.I. 12220), a new soft red winter wheat, moderately resistant to leaf [brown] rust [*Puccinia triticina*: see above, p. 120], and almost completely resistant to loose smut [*Ustilago tritici*: *R.A.M.*, xxvi, pp. 151, 385] and wheat mosaic virus was released to certified seed-producers in 1946. Produced by crossing Trumbull C.I. 5657, resistant to loose smut, with Fultz C.I. 11512, resistant to brown rust, Vigo is a winter-hard mid-season variety, the flour having high milling and baking qualities. The average rust infection of Vigo was 25·5 per cent. compared with 73 to 88 per cent. for Fairfield, Thorne, and Trumbull. It is highly resistant to most races of brown rust but moderately susceptible to race 76.

Björling (K.). **Observations on the development of Erysiphe graminis D.C.**—*Förh. fysiogr. Sällsk. Lund*, xvi, 19, pp. 187–203, 23 figs., 1946.

A full description is given of the author's cytological study at the University of Lund, Sweden, on fixed preparations of *Erysiphe graminis* from wheat [*R.A.M.*, xxvii, p. 68]. The development of the fructification was found to differ in the following features from that of other members of the Erysiphaceae. The initial hyphae present an exceptionally wide range of morphological variation. They cannot be regarded as gametangia, since they do not directly give rise to the dicaryophase but grow out into a homogeneous vegetative stroma, in the interior of which sexual reproduction is effected. No plasmogamous processes have been observed at any phase in the development of the fructification. The ascogenous hyphae form a fertile layer, covering the bottom of a central cavity in the interior of the fructification. The young asci are arranged in an open, hymenium-like layer.

The discussion is concerned with the relation of this ontogenetical type to that of other members of the Erysiphaceae, the question of meiotically conditioned possibilities of variation within the species, and the taxonomic position of powdery mildews. As regards the last-named aspect of the researches, no change is proposed in their present systematic status in consequence of the cytological anomalies described. The Erysiphaceae are considered to be cleistocarpous Pyrenomycetes, the order of the Perisporiales (sensu Gäumann, *Z. Bot.*, xxxv, 1940) being provisionally placed within the Ascohymeniales.

Hewitt (J. L.). **Registering parent Citrus trees.**—*Food Packer*, xxviii, 10, pp. 56, 58, 60, 2 figs., 1947.

On 1st March, 1937, the California State Department of Agriculture, in response to suggestions by Dr. H. S. Fawcett, announced that the State Nursery Service

would inspect for psorosis citrus trees selected by nurserymen as sources of propagating material and report results to each applicant. This service, known as the Citrus Tree Registry, was originally gratuitous, and up to the midsummer of 1941, 1,054 citrus parents had been registered. In the same year the Registry was established on a legal basis and uniform fees authorized for the service. These were fixed at $5 per tree, or $2 in the case of solid blocks in scion orchards, payable in both cases in three instalments as the work progresses. At the present time 90 growers avail themselves of the Registry's services, and the registered trees comprise over 600 Valencia and 160 Washington Navel oranges, 50 Eureka lemons, about 30 other citrus trees of ten varieties, and 780 in various stages of progress. Registration of individual trees is valid for a period of three years (subject to immediate cancellation in the event of infection or an imminent threat of psorosis), and is renewable for a further three-year period on payment of a flat fee of 50 cents per tree.

The biological conditions for registration specified by Dr. Fawcett include two essentials: (1) that the selected trees shall be more than 15 years old or provably derived from older trees available for inspection, and (2) that the registry shall be based on the absolute freedom from infection of the bark and leaves at 15 stations on each tree examined at an appropriate season. Recently a modification of the second proviso has been allowed, based on J. M. Wallace's discovery of a method of indexing [ibid., xxv, p. 298] on sweet lemon, which permits earlier determination in some cases and clarifies doubtful results.

Fawcett (H. S.) & Calavan (E. C.). **Wood pocket, a newly reported disease of Lemons.**—Abs. in *Phytopathology*, xxxvii, 11, p. 843, 1947.

Wood pocket (ligno-cortosis) was first detected in a strain of the Lisbon lemon at the Citrus Experiment Station, Riverside, California, in 1937. Underlying a defect or break in the bark the wood is discoloured and later discoloured regions are seen in a tangential cut as an irregular pattern of gum-filled tissue, darkly dotted on a paler surface. The lesions range from 1 in. in length to an extent of several feet along one side of the larger branches. Varying numbers of small, lenticular, yellow to ochreous spots, 0·5 to 1·5 mm. in diameter, in the trunk or branch cambium are the first internal symptoms. Trees propagated in 1939 by buds from apparently sound branches of diseased lemons developed wood pocket in 1945 and, on top-working to various species of citrus in 1946, transmitted the foliar symptoms to several lemon varieties. Some leaves present a variegated, chimaera-like aspect, with broad bands in shades of green through yellow to white or lace-like reticulations covering a part or the whole of the leaf blade. Seedlings from ripe lemon seed from diseased trees produce some plants with such symptoms. The implication of a virus is suggested by the features of the disease and its mode of transmission.

Rossetti (Victoria). **Porta-enxertos de Citrus resistentes a 'gomose' de Phytophthora e a 'tristeza'.** [Citrus stocks resistant to *Phytophthora* 'gummosis' and 'tristeza'.]—*Biológico*, xiii, 5, pp. 89–90, 1947.

The plan for the control of 'tristeza' root rot in São Paulo, Brazil, by the substitution of sweet for sour orange stocks in grafting operations [*R.A.M.*, xxvi, p. 486 and next abstracts] necessitates precautions in the selection of the former against gummosis, caused in the writer's preliminary inoculation experiments mainly by *Phytophthora citrophthora* (in 40 of the 100 varieties tested) and to a lesser extent by *P. parasitica*, *P. palmivora*, *P. cactorum*, *P. cinnamomi* [ibid., xx, p. 401], and *P. boehmeriae* [cf. ibid., xxiii, p. 296]. So far, the Barão, Natal, Pêra, Côco, and Mandarim varieties have provided the most promising material, combining resistance to gummosis with other desirable characters.

Meneghini (M.). **Reação de amido nas enxertias de 'seedlings' de Laranjeira utilizados em experiências de transmissão da 'tristeza'.** [Starch reaction in scions of Orange seedlings used in 'tristeza' transmission experiments.]—*Biológico*, xiii, 5, pp. 91–92, 1 fig., 1947.

The positive results of the application of the starch test for 'tristeza' root rot [*R.A.M.*, xxiii, p. 484; xxiv, p. 187] to sweet orange scions on sour orange stocks infected by means of *Aphis* (?) *tavaresi* in São Paulo [ibid., xxvi, p. 298] are considered to point to the identity of the disease with 'quick decline' [see next abstracts], in which the starch metabolism is similarly affected.

Bertelli (J. C.). **Notas fitopatológicas. Primer agregado al estudio de la etiologia de la 'podredumbre de las raicillas' o 'tristeza' de los Citrus.** [Phytopathological notes. First contribution to the study of the etiology of Citrus 'rootlet rot' or 'tristeza'.]—*Publ. mens. Direcc. Agron. Uruguay* 91, 16 pp., 21 figs., 1 diag., 1947. [English summary.]

The application of Fawcett's starch test for 'quick decline' [see preceding and next abstracts] to sections of citrus roots suffering from 'tristeza' in Salto and Montevideo, Uruguay [*R.A.M.*, xxiv, p. 98], failed to provide a clear-cut diagnostic criterion or to shed light on the possible connexion between the two diseases [ibid., xxvi, p. 298]. The roots of trees with 'tristeza' contained variable amounts of starch ranging from a reasonable quantity down to complete absence, as also did those affected by psorosis or by collapse resulting from an excess of nitrogenous manure. The starch content of the roots depended on the condition of the plants and the severity of the diseases or adverse factors involved.

So far, only negative results have been given by attempts to promote recovery from 'tristeza' by means of soil amendments. Signs of rehabilitation have been observed exclusively in sweet oranges inarch-grafted in 1940–1 with seedling stocks of the resistant sweet orange or *Poncirus trifoliata*.

Only between January and September, 1945, were the leaf spots and symptoms of 'tristeza' observed on the foliage of sweet orange, mandarin, and grapefruit grafted on sour orange stocks, of sour oranges where the sweet scion had died, and of sweet oranges grafted on sweet stocks. The foliar lesions associated with 'tristeza' might on cursory inspection be confused with those of 'lepra explosiva' [ibid., xxiv, p. 446], which has not yet been observed in Salto, though known to occur in the more northerly Department of Artigas. However, the 'lepra explosiva' spots extend from the upper to the lower leaf surface, whereas in the case of 'tristeza' the latter shows the barest trace of infection, if any. Furthermore, the pale zone surrounding the 'lepra explosiva' spots is absent from those of 'tristeza'. When the same plantings were revisited in 1946, there was not a trace of the disease in evidence, and its prevalence in the previous year is attributed, therefore, to a particular conjunction of temperature, humidity, light intensity, and similar factors beyond human control.

Olmo (H. P.) & Moreira (S.). **'Quick decline disease' and tristeza.**—*Calif. Citrogr.*, xxxii, 4, pp. 138, 175, 176, 3 figs., 1947.

The South American citrus disease known as 'tristeza' in Brazil [*R.A.M.*, xxvi, p. 486] and 'rootlet rot' in Argentina [ibid., xxv, p. 558] has recently been linked with a similar trouble in South Africa and Java [ibid., xxiii, p. 223; xxv, p. 111]. The authors review all the known facts concerning quick decline [ibid., xxiv, p. 409; xxvi, p. 297] side by side with those of 'tristeza' [ibid., xxiv, p. 98 and preceding abstracts] and conclude that all the observations show a close parallel in the two disorders and suggest that a similar infectious agent is responsible. In California, Washington Navel, grafted on sour orange and later top-worked with lemon,

ppears free from the disease in areas where other trees without conversion to lemon op are badly affected. In Brazil and Argentina sudden wilting and collapse is ıot usual, and the disease is found also on grapefruit and mandarin, on which it is t present unknown in California.

I. (J. M.). **Interrelatedness of quick decline and tristeza.**—*Calif. Citrogr.*, xxxii, 9, pp. 416–418, 1947.

This paper, taken from the South African journal *Citrus Grower* (March, 1947), eviews the comparison between citrus quick decline and 'tristeza' made by Olmo nd Moreira [see preceding and next abstracts]. In South Africa the disease, which s known as incompatibility, also occurs on grapefruit and mandarin, and has been nown since the beginning of the century, the original stocks and bud wood having een imported from Florida and California. The author considers it likely, how-ver, that the disease was already present in the country or that it was introduced rom Java or elsewhere in the East. If the three diseases are indeed due to the same r a very similar agent then it is concluded that they must be caused by a virus. Dr. H. S. Fawcett, in a comment, thinks that the theory of quick decline being ntroduced into California from South America seems doubtful, as the disease has ıot yet appeared on the very few budwood specimens that were received and grafted n to sour orange stock. The decline originated about 35 miles from the places at which the introduced trees were grown, and the spread has not yet reached these reas. None of the grapefruit and tangerine trees on sour orange within the infected rea have, as yet, shown any evidence of quick decline.

Terra (G. J. A.). **Citrus rootstock decline problem in Java.**—*Calif. Citrogr.*, xxxii, 10, pp. 444–446, 1947.

Normally citrus trees in Java are sparsely foliated, with stiff, dull green, some-imes bluish-green leaves, symptoms resembling those of trees suspected of quick ecline in California [see preceding abstracts]. Shaddocks [*Citrus maxima*] were riginally used as stocks, but all tangerines, oranges, and lemons propagated on hem died in a chlorotic condition within a year. A vigorous seedling tree, Japansche citroen' (Japanese lemon), probably a hybrid between *C. reticulata* and *imonia medica*, was useful as a stock but some oranges on it showed chlorosis nder certain conditions. Because of gummosis [*Phytophthora parasitica*: ibid. viii, p. 794], which occurred in some areas situated above 3,000 ft., new collections f oranges on sour orange stock and sour orange seeds were received from Florida, bout 1930. All these imported oranges died within two years. Some imported rapefruit plants on sour orange (Marsh seedless, Duncan, McCarty, and Triumph) topped growing after they had reached a height of 5 ft., turned yellow, and slowly ied. Tangerine, some lemon, and all orange scions on sour orange stock soon died. Native grapefruit (djeroek manis besar) and shaddocks grew excellently. Orange rees suffering from decline always had stiff, greyish or bluish, chlorotic leaves which ıter folded along the midrib and dropped. Sometimes the next flush developed the ame symptoms after a few weeks. Of the oranges budded on the sour orange tocks, approximately 5 per cent. lived longer than a year, but a quarter of these ied later. The remaining 50 plants are still alive, but in a poor condition. Plants om other imported seeds used as stocks gave the same results, but all oranges grew ell on sour orange 'Peradeniya', from the Peradeniya Botanical Garden, Ceylon, nd were still doing well in June, 1946. Planted as a seedling in a gummosis area, ıis stock has shown no sign of infection up to 1941. A native, gummosis-resistant angerine, djeroek keprok Batoe, also gave good results as an orange stock and etter trees than oranges on rough lemon. Cleopatra mandarin was also a satis-ıctory stock, but another tangerine stock, djeroek siem [*C. reticulata*], was a failure r Pineapple oranges, the plants dying after showing chlorotic symptoms. In

top-working experiments with a native grapefruit, tangerine and orange scions died, while shaddock grew normally.

Ten Japanese varieties of persimmon on *Diospyros lotus* stocks obtained from Yokohama developed very severe chlorosis and died within a year. On *D. kaki* stocks no chlorosis developed and early growth was normal although later growth was very slow.

SCHNEIDER (H.). **Quick decline and tristeza.**—*Calif. Citrogr.* xxxii, 10, pp. 448–450, 3 figs., 1947.

In comparative anatomical studies of citrus quick decline and 'tristeza' [see preceding abstracts], fixed specimens from 16 trees with varying symptoms of 'tristeza' collected at Limeira, Brazil, were examined at the Citrus Experiment Station, California. The same initial necrosis of sieve-tubes in the sour orange rootstock was found as in trees suffering from quick decline. In the most advanced stages of 'tristeza' the changes in the vicinity of the bud union were similar to those observed in trees with quick decline. It is suggested that both diseases are caused by viruses [ibid., xxvi, p. 242] in the sweet orange tops, which are either identical or acting in a similar manner. The stages of development of the two diseases for sweet orange on sour orange stock appear to be as follows: (1) the introduction of the virus into sweet orange top without apparent symptoms; (2) growth and spread of the virus throughout the tolerant sweet orange; (3) the downward movement of the virus or a by-product of its synthesis or metabolism in the sieve-tubes to the stock; (4) necrosis of the sour orange sieve-tubes; (5) utilization of the reserve foods in the sour orange stock by the sour orange roots; (6) a consequent weakening or death of the roots which are subject to attack by saprophytic soil organisms; and (7) the collapse or decline of the tree.

SUEDA (H.). **Experimental studies on the parasitism of black spot of Citrus.**—*Trans. nat. Hist. Soc. Formosa*, xxxi, 217–218, pp. 416–432, 1941. [Japanese, with English summary. Received December, 1947.]

The causal organism of citrus black spot [*Phoma citricarpa*: *R.A.M.*, xxvi, p. 394] was shown by experiments to develop in a parasitic form, not only in the fruits but also in the branch and leaf tissues. Healthy foliage of all kinds of citrus at any stage of growth, including seedlings and grafts, was found to harbour the pathogen, which infects new plants through the grafts besides attacking the leaves directly. As the plant develops, the fungus, which grows more slowly than its host, gradually progresses into the fruits.

URIBE ARANGO (H.). **La gotera del Café.** [Coffee leak.]—*Rev. Fac. Agron., Medellin*, vii, 26, pp. 249–260, 1947.

This is a summary of the available information on the host range, terminology, history, geographical distribution [*R.A.M.*, xxii, p. 48], importance, symptomatology, etiology, pathogenesis, epidemiology, and control of the coffee disease caused by *Omphalia flavida*, which was observed for the first time in Colombia [ibid., xviii, p. 402] in 1876.

BOYCE (A. M.) & FAWCETT (H. S.). **A parasitic Aspergillus on Mealybugs.**—*J. econ. Ent.*, xl, 5, pp. 702–705, 1947.

In the propagation of mealybugs in Californian insectaries, a fungus nearly related to *Aspergillus parasiticus* [*R.A.M.*, ix, p. 766; xxiii, p. 388] acts as a potentially serious parasite under conditions of high humidity and moderate to high temperatures. In artificial cultures the fungus killed two species, *Pseudococcus gahani* and *Phenococcus gossypii*, in periods ranging from 72 hours at 21° to 36 at

31° C. No mortality ensued at 13° to 17° even when the insects were heavily inoculated with spores. The control measures suggested are good ventilation, very careful irrigation of the host plants (potatoes), and lowering the temperature to 20° downwards. The differences in colour and spore size and appearance between the Californian and Hawaiian (*Bull. Hawaii. Sug. Plant. Ass.* 12, 1912) forms of the fungus are briefly discussed. They are regarded as insufficient to justify specific or varietal separation.

Cendaña (S. M.) & Baltazar (Clare R.). **A biological study of Empoasca flavescens Fabricius (Cicadellidae, Homoptera).**—*Philipp. Agric.*, xxxi, 1, pp. 1–17, 2 diags., 1 graph, 1947.

In the course of this study it was observed that during very rainy weather in the latter half of August and throughout September, 1946, numerous adults and nymphs of the cotton leafhopper, *Empoasca flavescens*, a serious pest of several cultivated crops in the Philippines, were killed by a fungus identified by G. O. Ocfemia as *Cephalosporium* sp. Its pinkish-white growth spread over the insects while they were attached to the leaves, and the organism appears to exert a severe check on their reproductive activities under favourable conditions.

Spangenberg (J.). **Ensayos de Linos de fibra en el Uruguay. Resultados obtenidos.** [Fibre Flax trials in Uruguay. Results obtained.]—*Rev. Fac. Agron. Univ. Montevideo*, xxxvii, pp. 83–151, 1 col. pl., 4 diags., 1944.

Reaction to the two most prevalent flax diseases in Uruguay, viz., rust (*Melampsora lini*) and 'pasmo' (*Septoria linicola*) [*Sphaerella linorum*] was one of the features studied in a comprehensive survey of seven Brazilian and four Argentine varieties [cf. *R.A.M.*, xxvii, p. 67] in comparison with Klein II, the standard variety cultivated in Uruguay, and (in some of the tests) Entre Ríos.

In the 1942–3 experiments the Argentine varieties, Concurrent, Blenda, Normandie, and Linkopis, proved definitely inferior to the Brazilian Caxias, Farroupilha, I.B.M. 10/1/1, I.B.M. 10, Viamão, AlCII 33, and AlCII 13, both in respect of disease resistance and seed production. In 1943–4 the lowest incidence of rust was shown by Klein II, Entre Ríos, and Viamão, with indices of 1·13, 1·15, and 1·69, respectively, where 0 = no infection and 5 = very severe, and the highest by I.B.M. 10, I.B.M. 10/1/1, and Caxias, with 3·02, 2·90, and 2·69, respectively. Moderate to severe infection by *S. linorum* occurred on all varieties in this series of tests, Caxias and AlCII 13 sustaining the maximum damage and AlCII 33 the minimum, which was significantly below the figures for all the rest, including Klein II and Entre Ríos.

On the grounds of their desirable agricultural and industrial characters, Viamão and AlCII 33, especially the former, are recommended as the most suitable for propagation for fibre production.

Reitz (L. P.), Hansing (E. D.), Davidson (F. E.), & Decker (Anna E.). **Viability and seed treatment of Flax.**—*J. Amer. Soc. Agron.*, xxxix, 11, pp. 959–970, 1947.

A review of the literature relating to flax seed viability reveals the implication of several factors, including weather conditions during the ripening and harvesting season, method of harvesting, stage of development when harvested, moisture content and temperature in storage, quality of the seed, extent of mechanical injury, embryo exposure, age, presence of seed- and soil-borne pathogens, fungicidal seed treatment, and genetic constitution of the different varieties. The results of tests on 2,049 samples from Kansas farms over the 12-year period 1934 to 1945 showed an annual variation of 18 per cent. in the average germination. Wet

weather in July and early August and delay in harvesting caused a reduction in germinability. The germination of Linota and Redwing was significantly higher than that of Bison or Viking.

New improved ceresan, Du Bay 1452 F, arasan, spergon, and phygon substantially increased the emergence of flax seedlings, the two first-named being significantly more effective at 1 than at ½ oz. per bush [cf. *R.A.M.*, xxvii, p. 20]. The improvement was particularly marked in the case of the yellow-seed varieties Viking and B. Golden. New improved ceresan significantly increased Linota and Bison yields in 1945, the average for the untreated, ½ oz., and 1 oz. plots being 8, 9·8, and 10·7 bush., respectively.

Batista (A. C.) & Couceiro (E. M.). **Crotalaria juncea Lin. e Fusarium javanicum Koord.** [*Crotalaria juncea* Linn. and *Fusarium javanicum* Koord.]—*Bol. Agric., Pernambuco,* xiv, 2, pp. 214–221, 9 pl., 1947.

With the aid of Coons and Strong's method for the diagnosis of *Fusarium* spp. by the use of growth-inhibiting substances in the culture medium [*R.A.M.*, xi, p. 119], the pathogen responsible for a vascular wilt of *Crotalaria juncea* in Pernambuco, Brazil, was identified as *F. javanicum* [ibid., xxvi, p. 207], not hitherto recorded on the host in question. Inoculation experiments on sterilized leaves and seedlings of *C. juncea* gave positive results.

Gould (C. J.). **Narcissus diseases in Washington.**—*Bull. Wash. St. agric. Exp. Sta.* 480, 27 pp., 9 figs., 1946.

The available information on *Narcissus* diseases, including those affecting daffodils [*N. pseudo-narcissus*], in Washington is summarized and presented in popular form, together with a useful symptom key and some general recommendations for control. The list comprises basal rot (*Fusarium oxysporum* f. *narcissi*, syn. *F. bulbigenum*) [*R.A.M.*, xii, p. 224; xxvi, p. 302], smoulder (*Botrytis* [*Sclerotinia*] *narcissicola*) [ibid., xxv, p. 203], fire (*S. polyblastis* [ibid., xxv, p. 453], white mould (*Ramularia vallisumbrosae*) [ibid., xx, p. 206], [leaf] scorch (*Stagonospora curtisii*) [ibid., xxv, p. 330], *Narcissus* mosaic virus [ibid., xviii, p. 680], decline (white or silver streak) [ibid., xix, p. 96], wet scale rot (*Sclerotium rolfsii* and *S. delphinii*) [ibid., xxii, p. 3; xxvi, p. 415], dry scale rot, caused by an undetermined sclerotial fungus, soft rot (*Rhizopus nigricans*) [*R. stolonifer*], and mushroom root rot (*Armillaria mellea*). Of these basal rot, mosaic, and decline are the most important; scorch is occasionally serious, mosaic-infected plants being especially susceptible.

Asthana (R. P.). **Studies on sclerotium-forming fungi—I. Sclerotium cepivorum Berk. and S. tuliparum Klebahn. Part 1. Cultural studies. Part 2. Symptoms, mode of infection and host range. Part 3. Pectinase activity and preparation.**—*Proc. Indian Acad. Sci.*, Sect. B, xxvi, 3, pp. 93–124, 3 pl., 1 fig., 7 graphs, 1947.

The literature on white rot of onions and other *Allium* spp. (*Sclerotium cepivorum*) [*R.A.M.*, xxvi, p. 325] and bulb rot of tulips and other flowering bulbs (*S. tuliparum*) [ibid., vii, p. 378; xvi, p. 614, *et passim*] is briefly reviewed. In the writer's studies at Nagpur, the only spores produced by *S. cepivorum* were microconidia, which developed exclusively on six- and three- to four-week-old plates of Brown's starch and tulip agars, respectively. They arise from conidiophores 6 to 10 μ long and are spherical, 2·5 to 3·4 μ in diameter, furnished with two walls, and often occurring in chains of two to eight. In germination experiments only 14 spores formed rudimentary germ-tubes and only in 20 per cent. tulip juice. Both species grew well on a large variety of natural and synthetic media, the development of *S. cepivorum* being favoured by acidity and that of *S. tuliparum* by neutrality or

alkalinity. Each species, however, tended to react to the juice of its own host by particularly luxuriant growth, while conversely, that of the other exerted an inhibitory effect. This was specially noticeable in cultures of *S. tuliparum* on media containing onion juice; the inhibitory factor was largely removable by boiling. The temperature range for the development of both species extended from 1° to 35° C., with an optimum near 20°.

The symptoms on the natural hosts and the mode of infection of *S. cepivorum* and *S. tuliparum* are described. The former species appears to be capable of penetrating the surface of intact roots, though rather slowly and uncertainly, whereas entry is freely gained through the natural wound at the stem base made by the emerging root. *S. tuliparum* attacks the base of the shoot and not the roots. White Spring Lisbon onion seedlings were subject to infection by *S. cepivorum* over the whole range of soil moisture at which ready germination of the seeds takes place, the disease reaching a climax between 40 and 60 per cent. The optimum temperature for the development of the symptoms ranged from 13° to 18°. In inoculation experiments *S. tuliparum* caused 80 to 100 per cent. infection on Artus and Prince of Austria tulips, *Scilla sibirica*, crimson hyacinth, *Chionodoxa luciliae*, and King of Whites iris (*Iris hispanica*); 40 to 60 per cent. on Peach Blossom *Gladiolus*, *Narcissus poeticus ornatus*, Princeps daffodil [*N. pseudo-narcissus*], Light Blue *Crocus*, and single snowdrop; 20 per cent. on winter aconite [*Eranthis hyemalis*] rhizomes; and none on onion, shallot, or leek. On the other hand, *S. cepivorum* severely attacked white onions and caused 20 to 25 per cent. infection on the red varieties, Musselburgh leeks, and shallots, but was innocuous to the hosts of *S. tuliparum*. Moist atmospheric conditions and autoclaved soil enhanced the pathogenicity of both species to nearly all the plants tested.

Pectinase was secreted by *S. cepivorum* and *S. tuliparum* [cf. ibid., xvii, p. 546] on a number of substrata, the former species yielding more active preparations of the enzyme on onion than on tulip tissue, while in the case of the latter the position was reversed. Tulip tissue proved to be specifically more sensitive to the enzyme of *S. tuliparum* than to that of *S. cepivorum* and vice versa. The enzyme prepared from *S. cepivorum* was more tolerant of acidity than that of *S. tuliparum* [cf. xii, p. 184].

Mariat (F.). **Sur une nouvelle maladie bactérienne du Pelargonium.** [On a new bacterial disease of the *Pelargonium*.]—*C.R. Acad. Sci., Paris*, ccxxvi, 1, pp. 115–116, 1948.

Pelargonium zonale plants in the greenhouses of the Institut Pasteur, Paris, have recently been attacked by a destructive black rot of the stem, accompanied by wilting and shedding of the leaves. The diseased plants contained a brown liquid swarming with bacteria interspersed with fragments of disintegrated tissue. Transverse sections through the stem at an early stage of infection revealed bacteria localized in the lumina of certain woody vessels, which gradually became so full that the organisms overflowed into the adjacent parenchyma. At an advanced phase of the stem rot the cell membranes are destroyed and cavities develop full of bacteria.

The bacterium occurs in pairs or groups of three and measures 1·3 to 2 by 0·8 to 1 μ. It forms neither spores nor capsules, is non-motile, devoid of flagella, Gram-negative, non-acid-resistant, and strictly aerobic, with an optimum temperature of about 25° C. On plain agar it forms circular, well-defined, smooth, humid, glistening, pale yellow colonies, with a translucent periphery and opaque centre. Profuse growth is made on potato slices, of a deeper yellow than on agar. The bacterium did not develop on Cohn's solution or on Naegeli I, on Uschinsky's growth was poor, but on Naegeli II it was abundant after 36 hours. In peptonized water plus litmus starch, inulin, glycerine, mannitol, levulose, saccharose, dextrose,

maltose, and lactose were not utilized. Milk was coagulated and gelatine liquefied. The bacterium did not form indole, ammonia, or hydrogen sulphide, or reduce nitrates to nitrites. It is named *Aplanobacter magroui* n.sp.

The typical symptoms of the disease were readily reproduced by needle-prick inoculations on the stem.

Diseases of Chrysanthemums.—*Agric. Gaz. N.S.W.*, lviii, 10, pp. 535–538, 4 figs., 1947.

In New South Wales susceptible chrysanthemum varieties are severely attacked by leaf spot (*Septoria chrysanthemella*) [*R.A.M.*, xxiv, p. 192] and rust (*Puccinia chrysanthemi*) [ibid., xx, p. 194; xxiii, p. 179]. Where resistant varieties are not grown the diseases can be controlled by cutting and burning the remaining flower stalks, immersing cuttings, previously stripped of all but the youngest leaves and tied either in small bundles or loosely in a hessian bag, for five to ten minutes in Bordeaux mixture (1–1–20). After the cuttings have commenced to grow they should be sprayed thoroughly with Bordeaux (1–1–30) at four- to six-weekly intervals in dry, and fortnightly in wet, weather. Spraying should cease four to six weeks before flowering, otherwise the spray deposit on the foliage becomes too heavy. Home-made Bordeaux mixture is the most effective; copper oxychloride (cuprox, oxycop, or soltosan [ibid., xxiii, p. 251]) is also recommended.

Powdery mildew (*Erysiphe cichoracearum*) [ibid., vi, p. 305] occurs occasionally towards the end of the season, especially in shaded positions. Plants suffering from *Verticillium* wilt caused by *V. dahliae* [ibid., xxi, p. 203] and spotted wilt [tomato spotted wilt virus: ibid., xxii, p. 240] should be burnt. Soil infested with *V. dahliae* can be cleaned by applying 1 gal. formalin (1 in 50) per sq. ft. and covering the area for a few days.

Sprague (R.). **Controlling root rots of cereals and grasses.**—*Bi-m. Bull. N. Dak. agric. Exp. Sta.*, ix, 2, pp. 40–45, 1946. [Received January, 1948.]

To reduce losses by pathogens causing root rots of cereals and grasses in North Dakota [see next abstract], viz., *Pythium arrhenomanes* [*R.A.M.*, xxvi, p. 538], *Helminthosporium sativum* [ibid., xxv, p. 256], *P. debaryanum* [ibid., xxvi, pp. 380, 549], and *Fusarium graminearum* [*Gibberella zeae*: ibid., xxv, p. 406], as well as *P. graminicola* [ibid., xxvi, pp. 380, 392], *P. irregulare*, *P. ultimum*, and *F. culmorum*, clean, healthy seed treated with new improved ceresan (½ oz. per bush. for cereals and ¾ to 1 oz. for grasses) [ibid., xxvi, p. 390] should be sown in soil with adequate nitrogen and phosphorus, and crops should be rotated with grass and lucerne. Root rot losses are usually reduced when maize is grown following the ploughing-under of green manure or sod, and when rotations include wheat, oats, and maize or fallow. Grass should follow oats or a crop that is not too susceptible to *P. arrhenomanes* and the seedlings should be over six weeks old during the critical May to June blight period. Crop land should be kept free from weeds, particularly pigeon grass [*Setaria glauca*], which is a carrier of root rot fungi. Tolerant or improved grass strains offer more resistance to attack. A table summarizes the data on the relative resistance of certain grasses to the common root rot fungi: at Mandan, Kentucky bluegrass [*Poa pratensis*] is listed as resistant to *H. sativum*.

Thirumalachar (M. J.) & Dickson (J. G.). **Chlamydospore germination and artificial culture of Ustilago striiformis from Timothy and Bluegrass.**—*Phytopathology*, xxxvii, 10, pp. 730–734, 2 figs., 1947.

At Madison, Wisconsin, satisfactory germination of fresh chlamydospores of *Ustilago striiformis* from timothy (*Phleum pratense*) and bluegrass (*Poa pratensis*) [*R.A.M.*, xxvi, p. 110] was secured by the method described by the first-named author (*J. Indian bot. Soc.*, xix, pp. 71–75, 1940). Glass slides with a dried smear of

pores were inverted on a rack 1 in. above a water surface and covered with wet paper towelling. Spores collected in the autumn from field plants and treated as described began to germinate after five days at 65° to 72° F. and 30 to 70 per cent. had germinated after ten days. Spores from the sori covered by the epidermis germinated two days earlier and with higher percentages than those from the older ones. Germination percentages of about the same order were obtained from spores collected from greenhouse plants or from field crops in the spring.

U. striiformis germinated both by means of sporidia and branching promycelia [*R.A.M.*, iii, p. 743; xix, p. 351; xxiii, p. 21; xxvi, p. 111]. In the autumn series of experiments, some of the promycelia elongated either indefinitely or up to 400 μ without branching, while others developed two or three septa and short branches. Sporidia did not appear under the moist conditions of these tests, but when some of the slides were transferred to a semi-dry atmosphere after the onset of germination, the promycelia formed septa followed by constriction of the cells into sporidium-like structures. The promycelia arising from single spores placed on 5 per cent. water agar soon after the beginning of germination segmented after four days into numerous sporidia. The germination of fresh spores collected on timothy in the following spring indicated the same response to low moisture. Moreover, sporidia were produced by 80 per cent. of the spores dried after eight days in water, or as soon as germination commenced, and replaced in the germination chamber on three consecutive days.

Cultures of several types were obtained from isolates from both the above-mentioned hosts. For instance, a sporidial form producing masses of secondary sporidia arose from bluegrass spores. On certain media the sporidial types tended to produce mycelial sectors. Both mycelial and sporidial types developed from spores collected on timothy. The fragmenting-mycelial type gave rise to a fine, densely interwoven mycelial mat. Along the periphery of the colony finely coiled hyphae abstricted small, oidioid cells (sporidium-like according to Leach *et al.* [ibid., xxv, p. 264]), which on separation developed into new colonies. Chlamydospores were formed in many of the older colonies. They were usually ovate or lemon-shaped, though those of one isolate were spherical. All were less markedly echinulate and rather larger than in nature. Some of the mycelial and other types arising from the spores from timothy remained vegetative, whereas others sporulated profusely. In the latter the small, yellowish-brown, short hyphae developed close septations, the cells assumed an ovate shape, and the walls thickened. The lemon-shaped spores either remained attached or fell apart.

FISHER (D. F.) & COOLEY (J. S.). **Apple scald and its control.**—*Fmrs' Bull. U.S. Dep. Agric.* 1380, 9 pp., 2 figs., 1947.

This bulletin is a revision of that published in 1923 [*R.A.M.*, iii, p. 340] and gives the essential information about apple scald and preventive measures. The most effective control is achieved by the use of oiled paper, either as wrappers or in shredded form [ibid., xxv, p. 507 *et passim*].

LOUW (A. J.). **The Fusicladium or scab disease of Apples. II. The origin of the initial infections each year.**—*Fmg S. Afr.*, xxii, 258, pp. 749–752, 5 figs., 1947.

Continuing his study on apple scab [*Venturia inaequalis*: *R.A.M.*, xxvii, p. 25 and the next abstract] the author states that in the winter-rainfall area of the Cape the sole important initial source of infection is from the fallen infected leaves. Winter spraying of trees can therefore have no effect on the disease in this locality. Locally, foliage sprays to prevent primary infections from ascospores in spring should continue until the middle of November. The duration of this period depends, however, on the weather conditions that preceded it [see next abstract]. If little rain falls in the preceding months, rains in November or December may induce

copious ascospore discharge and heavy infection, whereas if rainfall is good in September and October, few ascospores remain by November, and if the trees show no sign of infection no further spraying is necessary.

Louw (A. J.). **Fusicladium of Apples. III. A few factors affecting the incidence of the disease.**—*Fmg S. Afr.*, xxii, 259, pp. 833–836, 1 fig., 1947.

Continuing his studies on apple *Fusicladium* disease [*Venturia inaequalis*: see preceding abstract] in South Africa, the author states that early leaf fall during the dry period of the year severely restricts the amount of infection during the subsequent year as the fungus does not survive such dry conditions. Conversely, where the leaves are retained longer epidemics are likely to occur the following spring. Observations also showed that the development of the winter stage is delayed when the old leaves are exposed to excessive moisture, as ascospore liberation then coincides with full foliation.

The development of the first stages of the overwintering phase occurs best at 7° to 13° C. Later, warmer weather is needed, the most suitable temperature for the maturing of the ascospores being about 20°. If the early winter temperatures are relatively high, development may be very slow and very few perithecia may be formed, but cold weather immediately after the leaves have fallen conduces to the formation of a large primary source of infection for the following season. Warm weather during the final stages of development may so accelerate maturation of the ascospores as to induce their release into the air in winter.

The evidence obtained demonstrates the dominating influence of winter temperatures on the epidemiology of the disease. In 1942, for example, a severe outbreak occurred in Ceres, low temperatures having greatly delayed maturation of the ascospores which were liberated after foliation and primary infections occurred on an extensive scale. In Elgin, where the winter temperatures are higher, the ascospores are released long before foliation, and very little primary infection results. Further, warm winters delay foliation and areas with mild winters, such as Paarl, Stellenbosch, and Villiersdorp, are seldom subject to attack, although the spring is usually very wet. Winter temperatures also appear to account, to a large extent, for the variations in the severity of the outbreaks from year to year. Between 1940 and 1945, only one severe outbreak occurred in Elgin; this was in 1943–4, when the average daily temperature from June to August was the lowest for the period 1939 to 1945. Other records of severe outbreaks in other parts of the winter-rainfall area also coincide with relatively low winter temperature records.

These data provide a basis for estimating in advance the probable severity of the disease in any particular season and should make it possible to warn growers in the localities where severe outbreaks are likely to occur.

Hilton (R. J.). **Fire blight in Alberta. A serious scourge of Apple trees.**—*Pr. Bull. Univ. Alberta*, xxxii, 1, pp. 2–3, 1947.

During 1946 apple fireblight [*Erwinia amylovora*: *R.A.M.*, xxii, p. 10; xxvi, p. 399] reached epidemic proportions round Edmonton, Alberta, resulting in serious losses of ornamental crab and apple trees. The author stresses the importance of constant watchfulness for outbreaks of the disease throughout the growing period. An orchard may be cleared of the disease if in the dormant season cankered branches are cut 4 to 6 in. below the infected area and the wounds disinfected with a bactericide, the most effective being a solution of 1 oz. mercuric chloride and 1 oz. mercuric cyanide in 3 gals. glycerine and 1 gal. water. Summer pruning should take place immediately after the appearance of the symptoms at two- to three-day intervals, and all tools (as well as the wounds) should be disinfected after every cut. If trees grow too vigorously in soils too rich in nitrogen, addition of superphosphate

ives a better nutritional balance and reduces succulent growth which is more able to become infected. The apple varieties resistant during the epidemic of 946 were Charlamoff, Duchess, Godfrey, Greening, Haralson, Hibernal, Hibkee, Keetosh, Manton, Miltosh, Patten, Redant, and Russ; and the crab apples thabasca, Calros, Columbia, Dolgo, Elsa, Garnet, Piotosh, Rosilda, Rosybloom, nd Trail. At least 75 per cent. of the seedlings of the widely used ornamental rab apple Siberian Crab were highly susceptible.

HARVELLE (E. G.) & BURKHOLDER (C. L.). **Peach brown rot.**—*Hoosier Hort.*, xxix, 8, pp. 115–119, 1947.

The average annual reduction in the United States peach crop from brown rot *Sclerotinia fructicola*) [*R.A.M.*, xxiv, p. 23] is estimated at 1,565,200 bush., orresponding to a monetary value of $2,000,000. The disease is also responsible or severe damage in transit, having in all probability been largely responsible for he $936,065 paid out as compensation by the Association of American Railroads n 1945. Control of the pathogen should begin with stricter attention to general rchard sanitation, especially in regard to the clearance of 'mummies' from under he trees after the harvest. The recent trend towards the planting of four or five arieties with a combined ripening season from Golden Jubilee and Redhaven until he end of the Elberta harvest has complicated control and necessitates special reatments for all the early maturing varieties, especially the susceptible Red Bird. Where serious losses from brown rot are anticipated, spraying is more effective han dusting. The Purdue spray schedule, applicable to the 'pocket' area of the State, roughly comprising Vanderburgh and adjacent communities, includes a reatment with 6 lb. wettable sulphur when 25 per cent. of the blossoms are open nd the use of either sprays or sulphur dust for the six weeks preceding harvest. Soluble fungicides, such as zerlate, are very promising for use during the two or hree days immediately before picking.

SMITH (C. O.). **A study of Tranzschelia prunispinosae on Prunus species in California.** —*Hilgardia*, xvii, 7, pp. 251–266, 8 figs., 1947.

Studies on *Tranzschelia* [*Puccinia*] *pruni-spinosae* [*R.A.M.*, xx, 215; xxv, p. 2; xxvi, p. 113], only the *discolor* type of which has been observed in California, showed that experimental inoculations of *Prunus* spp. with the organism from almond, peach, prune, and damson resulted in some pathogenicity. Peach and almond were susceptible to the rust from almond, peach, and prune; Standard prune and other varieties of *P. domestica*, as well as damson, were susceptible to the rust from prune and damson. The rust from peach and almond gave only light infection on Standard prune, in the form of very small, inconspicuous spots which did not develop sori, except, perhaps, a few near the leaf margin. Peach, however, was severely infected by the rust from Standard prune and damson. Rust symptoms on almond closely resemble those on peach, the main difference being the copious production of teleutosori on almond.

Orchard observations and the results of interspecific inoculation tests indicate that the rusts on peach and Standard prune may represent at least two different strains.

HUSZ (B.). **Mikólogiai vizsgálatok pusztuló Kajszifákon.** [Mycological investigations on apoplectic Apricot trees.]—*Acta mycol. hung.*, iv, 1–2, pp. 6–12, 1 diag., 1947. [English summary.]

Fungi were found to be partly responsible for the destructive apricot disease in Hungary known as 'apoplexy' [*R.A.M.*, xv, p. 591; xvii, pp. 501, 537]. *Verticillium albo-atrum*, for instance, was isolated from two-year-old apricot and myrobalan (*Prunus cerasifera*) nursery trees at Kecskemét with symptoms of leaf wilt,

defoliation, and 'black heart' of the woody portions of the stem and, to a lesser extent, of the roots [cf. ibid., xiii, p. 180]. Microscopic examination revealed the mycelium in the water-conducting vessels. A three-year survey of bearing trees disclosed the presence of the same pathogen in 19 out of 169 (11 per cent.) with evidence of die-back, the oldest being eight years. It is concluded that *V. albo-atrum* alone suffices to cause the death of young apricot trees, ingress to which may be gained through injuries on the aerial organs.

Armillaria mellea was concerned in the desiccation of five- to ten-year-old apricot trees in an orchard near Budapest formerly covered by oaks. Plums, peaches [ibid., xxvi, p. 344], and Persian walnuts are often attacked by the same pathogen, while the almond (used as a rootstock) is also very susceptible. One of the most common occupants of dying and dead apricot trees, especially in loose, sandy soils poor in nutrient substances, is *Schizophyllum alneum* [*S. commune*: cf. ibid., xxiii, p. 25]. *Valsa leucostoma*, in its conidial state *Cytospora rubescens* [cf. ibid., xiv, p. 15; xv, p. 447, *et passim*], is widespread on moribund apricot trees, being found, for instance, on branches with withered leaves and on cankered stems, while the cortex also may be full of pycnidia. However, *S. commune* and *V. leucostoma* are regarded as sequels to die-back rather than agents of the condition. *Stereum purpureum* occurs on the apricot, apple, plum, and peach.

Taylor (C. F.) & Peet (C. E.). **Bitter rot on sour Cherry.**—*Plant. Dis. Reptr.* xxxi, 10, pp. 392–393, 1947. [Mimeographed.]

A sour cherry fruit rot of unusual appearance occurred in 1947 at the end of the harvesting period in Jefferson County, West Virginia. Tissue culture isolations from diseased cherries yielded *Glomerella cingulata* [*R.A.M.*, xxv, p. 400]. The only previous record in the United States was made in Indiana in 1915.

Wood (C. A.) & Whitehead (T.). **Etiology of Strawberry virus diseases.**—*Nature, Lond.*, clx, 4074, pp. 761–762, 1947.

This account summarizes the recent work on strawberry virus diseases carried out at East Malling and North Wales, much of which has already been noted in this *Review* [*R.A.M.*, xxvi, p. 400]. The authors effected the separation of the components of the virus complex by the daily transference of infective aphids (*Capitophorus fragariae*) along a series of *Fragaria vesca* indicator plants. Those colonized on the first day developed symptoms differing from all those infected subsequently [cf. ibid., xxv, p. 459], thus indicating a non-persistent and a persistent component in the complex. Analysis of the diseases found in the field suggested that mild crinkle in Royal Sovereign is due to the non-persistent virus and yellow edge in Royal Sovereign and 'degenerate' Huxley to both components, which were also obtained from normal vigorous Huxley (Malling 44). The persistent viruses isolated from the three last-named all appear to differ from that from Royal Sovereign with severe crinkle. 'Degeneration' was induced in Huxley M 44 by colonization with aphids from yellow-edge Royal Sovereign, or 'degenerate' Huxley or Oberschlesien with symptoms resembling yellow edge but not by those from Royal Sovereign showing mild or severe crinkle. This supports the view that the virus causing yellow edge differs from that causing crinkle. Symptom analysis led to the conclusion that symptom variability in Royal Sovereign and *F. vesca* is a function not only of virus content but also the individual reaction of each plant, a factor of importance in field surveys and in research.

Pearse (H. L.). **Marginal scorching and chlorosis of the leaves of berry fruits.**—*Fmg S. Afr.*, xxii, 258, pp. 742–745, 1 fig., 1947.

In April, 1946, the author's attention was directed to the unhealthy appearance of leaves of boysenberry and youngberry plants in a light, acid soil (pH about 4·5)

the Wemmershoek Valley, South Africa. The leaves in the middle and basal gions of new young canes were those most severely affected. The first symptom as a marginal yellowing followed by a brownish to cream chlorosis extending in- ards between the main veins, the discoloration seldom, however, reaching the idrib. Finally, in severe attacks, the leaf margins became badly scorched and y, while the dark-brown tissue tended to curl inwards.

Approximate, quick, mineral tests showed that magnesium was at a low level all samples taken, and especially in unhealthy leaves and shoot tips. The otassium level was exceptionally high in all samples, and slightly higher in affected an in healthy shoots. Soluble phosphorus was very slightly lower in unhealthy an healthy shoots.

A field experiment was carried out using five treatments on boysenberry plants. ll plots received (1) ammonium sulphate, 250 lb. per acre, four receiving in addition r acre (2) lime 1,250 lb. and magnesium sulphate 500 lb.; (3) potassium sulphate 50 lb.; (4) potassium sulphate 250 lb. and sodium phosphate 500 lb.; and (5) otassium sulphate 250 lb., lime 1,250 lb., sodium phosphate 500 lb., and mag- esium sulphate 500 lb. The applications were made at the end of December, 1946. owards the middle of February, 1947, the leaf symptoms began to appear in arying degrees. On 3rd March, 1947, the number of affected leaves on the five lots, respectively, totalled 538, 158, 613, 420, and 162, the numbers of leaves owing severe symptoms being 118, 14, 188, 121, and 11, respectively. These sults clearly demonstrate that lime and magnesium sulphate significantly reduced ne number of affected leaves. The increased number of affected leaves on the plots ceiving potassium sulphate, taken in conjunction with the greatly decreased umber in the plots given magnesium sulphate, further supports the evidence that ne symptoms were due to magnesium deficiency aggravated by an unbalanced otassium/magnesium nutrition.

As similar symptoms have since appeared on berry plants at Groot Drakenstein nd other places near Stellenbosch, it is thought that the disorder may prove of nsiderable importance to the expanding berry industry. The trouble is most kely to occur where berries are grown on acid soils (owing to the increased agnesium solubility), and is likely to be made worse by potash applications. xact control measures remain to be worked out. Meantime, it is pointed out at elsewhere magnesium sulphate applications at rates of 50 to 100 lb. per re have sometimes given improved yields and better-quality fruits in berry antations.

ADMAN (C. H.) & HILL (A. R.). **Aphid vectors of European Raspberry viruses.**—*Nature, Lond.*, clx, 4076, pp. 837–838, 1947.

Preliminary experiments conducted in 1944 and 1945 demonstrated that the hids *Amphorophora rubi* and *Aphis idaei* were vectors of the viruses causing two pes of raspberry mosaic in Scotland. This was confirmed by further experiments 1946. Populations of aphids were fed for 12 hours, 3, 7, 14, and 21 days on entire ants or detached leaves of apparently healthy Lloyd George raspberry, carrying ne mosaic 2 virus or viruses of Harris [*R.A.M.*, xxvi, pp. 159, 160]. Large numbers the insects were then transferred to each of ten virus-free Norfolk Giant plants nd allowed to feed on them for varying periods up to 14 days. With one exception l plants to which *Amphorophora rubi* was transferred developed mosaic 2 symp- ms only. Six of 50 plants on which *Aphis idaei* had fed and the one exception ove showed distinct symptoms of a hitherto unrecorded disease, provisionally lled 'curly dwarf' (Harris and Prentice *in litt.*). Grafting to indicator plants nfirmed the presence of these viruses in the Lloyd George stock.

Both aphid species appear to require more than 12 hours to acquire the viruses, nd *A. idaei* appears to be markedly specific in its transmitting powers.

Usually large numbers of aphids are required to overcome the difficulties of transmission but in one experiment mosaic 2 was transmitted by employing only 25 to 50 individuals of *Amphorophora rubi* on seedling plants from a Norfolk Giant × St. Walfried cross. The results are in conformity with the slow rate of mosaic spread in the field.

ANDERSON (E. J.). **Laboratory studies of root-rot infection in Pineapple in relation to nutrient concentration.**—Abs. in *Proc. Hawaii. Acad. Sci.*, xxii, p. 7, 1947.

Severe root and heart rot of pineapple (*Phytophthora cinnamomi*) is most prevalent in Hawaii [*R.A.M.*, xx, p. 151] in areas of high rainfall and during wet weather. Since these conditions would tend to excessive leaching, dilution of the soil was thought likely to influence the virulence of the disease.

In inoculated water cultures root rot infection decreased with increasing concentration of total nutrients and with high potassium in solutions of moderate total nutrient concentration. In tap water, in dilute nutrient solutions, and all solutions low in potassium, root infection was essentially complete ten days after inoculation. In concentrated solutions and in those high in potassium infection became evident only after 30 days and did not exceed 8·5 and 7·5 per cent., respectively, after 3[illegible] days, when the experiment was terminated.

Limited observations of *P. cinnamomi* on diseased roots in the more concentrated solutions revealed abnormal production of zoospores, which are probably responsible for most of the infection in solution culture. The vegetative growth of the fungus in solutions of similar nutrient salt concentrations in 20 per cent. pineapple juice reached a maximum in the most concentrated.

In short-term pot cultures of pineapple crowns in naturally infested soil, root and heart rot were substantially reduced by heavy applications of a complete fertilizer and by lighter treatments with the same plus a heavy potassium sulphate amendment.

VINCENT (J. M.). **The esters of 4-hydroxybenzoic acid and related compounds. Part I. Methods for the study of their fungistatic properties.**—*J. Soc. chem. Ind., Lond.*, lxvi, 5, pp. 149–155, 6 graphs, 1947.

In this introductory paper the author describes the methods and criteria that have been developed at the School of Agriculture, University of Sydney, New South Wales, for a critical evaluation of the fungistatic action of 4-hydroxybenzoic acid and chemically related compounds, together with some cognate aspects arising from the application of these methods.

Inhibition is determined as reduction in growth rate and particular attention has been paid to dosage/response curves as providing a sound basis for comparisons between substances. The moulds used were *Aspergillus niger*, *Byssochlamys fulva* [*R.A.M.*, xxi, p. 206], and *Penicillium roqueforti* [ibid., xxi, p. 80]. In the absence of an inhibitor growth/time curves were linear for all three organisms once the colony had attained a diameter of 10 mm. *A. niger* and *P. roqueforti* reacted comparably in the presence of an inhibitor, but *B. fulva* showed a persistent acceleration of growth often resulting in a final diameter exceeding that of the control. In the two first-named species growth rate (mm. per 24 hours) in the linear phase has been used, while for *B. fulva* it was determined as soon as possible after the colony had reached 10 and before it exceeded 20 mm.

The dosage/response relationship for *A. niger* assumes the form $y = ax^b$, where y = inhibition, x = concentration of inhibitor, and a and b are constants, the latter less than 1. From this relationship inhibitory substances can be described in terms of b (slope of logarithmic dose/logarithmic response curve) and $\log I_{50}$ (i.e. log. concentration giving 50 per cent. inhibition). *B. fulva* can be similarly interpreted, though here the matter is complicated by the acceleration in the

owth/time curve and log I_{67} should be substituted for log I_{50}. Experimental values . *P. roqueforti* can be interpreted as the resultant of an inhibitory action (logarith- c as before) and a stimulation rising to an early limiting value. In this case the termination of b is impracticable and inhibition is best expressed as log I_{50} tained graphically from experimental points. Log I_{25} permits comparison at other part of the curve. Constants b and log I_{50} determined for *A. niger* may vary nificantly, for an unknown reason, in different tests. Log I_{50} is related to some tor affecting the growth rate.

The methyl ester causes marked shortening, thickening, and branching of the phal tips, often accompanied by a very striking zigzag form of growth. No such anges were induced by higher esters at concentrations causing a comparable gree of inhibition.

VILL (G. W. K.) & VINCENT (J. M.). **The esters of 4-hydroxybenzoic acid and related compounds. II. Relationship between the fungistatic activity, and physical and chemical properties of the esters.**—*J. Soc. chem. Ind., Lond.*, lxvi, 6, 175–182, 8 graphs, 1947.

The preparation of the methyl, ethyl, *n*-propyl, *iso*-propyl, *n*-butyl, *sec*-butyl, -butyl, *n*-amyl, *iso*-amyl, *n*-hexyl, (2-methyl)-amyl, *n*-heptyl, and (2-ethyl)- xyl esters of 4-hydroxybenzoic acid [see preceding abstract] is described. They re tested for toxicity to *Aspergillus niger*, *Byssochlamys fulva*, and *Penicillium rueforti*. The inhibitory action is described principally in terms of b (slope of the arithmic dosage/logarithmic response curve) and an inhibitory index (I), being reciprocal of the millimolar concentration required to secure an efficient level of ibition. *P. roqueforti* does not lend itself to determination of b, instead of which inhibition index was determined at two points on the dosage response curve.

In the case of *A. niger* and *B. fulva*, b may be regarded as substantially identical all the esters tested. The logarithm of I plotted against chain length showed a neral increase from methyl to hexyl, with a much slighter increase, or none, from xyl to heptyl. The three moulds, however, showed specific differences in their ailed reaction to successive esters. Tested against *A. niger*, branched esters were se to, and usually slightly less than, the values for the corresponding normal s. Differences are reported for the reaction of *A. niger* to the free acid. Ex- ience with related compounds and ring-substituted esters of 4-hydroxybenzoic d (intended for later publication) is briefly noted. Some physico-chemical ects of inhibition by the compounds under trial are discussed.

LSON (J. K.) & CHOUDHRI (R. S.). **Effects of DDT on certain microbiological processes in the soil.**—*J. econ. Ent.*, xxxix, 4, pp. 537–538, 1946.

DDT, applied at dosages far in excess of those required in practice for insect trol, exerted no adverse effects on *Aspergillus niger*, *A. oryzae*, *Penicillium ansum*, *P. italicum*, *P. roqueforti*, six unidentified fungi, three Actinomycetes, l other micro-organisms in sandy loam soil or in pure culture on an agar medium [*R.A.M.*, xxvii, p. 32]. There was no evidence, moreover, of appreciable erference by the insecticide with ammonification, nitrate accumulation, and normal concentration of salts in the soil.

cialpraeparatar til Bekæmpelse af Plantesygdomme og Skadedyr anerkendte af Statens Forsøgsvirksomhed. Gyldig for Aaret 1947. [Special preparations for the control of plant diseases and pests approved by the State Experimental Service. Valid for the year 1947.]—*Tidsskr. Planteavl.* li, 2, pp. 342–353, 1947.

nalyses are furnished of a number of fungicides and insecticides approved by Danish Plant Protection Service for use in 1947. Under the heading of Kemi- iekontrollen i 1946 [Inspection of chemical substances in 1946] (pp. 354–356),

J. L. Schnicker contributes particulars of infringements of the plant-protective and poison laws detected in the course of the official examination in 1946 of 380 samples [cf. *R.A.M.*, xvii, p. 332; xxv, p. 567].

Wager (V. A.). **Can rust kill the Bramble?**—*Fmg S. Afr.*, xxii, 259, pp. 831–832, 1 fig., 1947.

The American bramble (*Rubus fruticosus* var. *bergii*) is a serious pest in the midlands of Natal, where in the last few years it has spread with such rapidity that large areas of farm land (20,000 acres in October, 1946, according to one report) have had to be abandoned.

The rust disease (*Kuehneola albida*) [*K. uredinis*: cf. *R.A.M.*, vi, p. 41] was reported, in January, 1947, to have killed the plants and almost completely cleared one farm in the Richmond area. In April, 1947, the author observed a patch of bramble about 10 yds. in diameter in the Boston area apparently killed off; only the stalks remained, and the leaves, which had been shed, were completely covered by the fungus. It is not known, however, whether such plants can recover.

As a disease that would kill this bramble would be very welcome, it is suggested that farmers might try the effect of experimentally infecting the bushes, by collecting diseased branches, placing them in a bucket of water, stirring briskly (repeating the operation next day), and spraying on to healthy bushes.

Venkatarayan (S. V.). **The training of plant pathologists in India.**—*Curr. Sci.*, xvi, 11, pp. 335–336, 1947.

In connexion with the recommendations of the Plant Pest and Diseases Committee of the Council of the Association of Applied Biologists for the recruitment and training of plant pathologists in Great Britain [*R.A.M.*, xxv, p. 463], the author briefly discusses the corresponding problem in India, where the position in regard to mycology has barely improved since 1919, when the second meeting of mycological workers of the Board of Agriculture addressed a strong plea to the Universities for the inclusion of mycology in their curricula. The agricultural colleges offer a rather better course, but not up to the standard required to produce efficient plant pathologists.

Dastur (J. F.). **Live fungi culture collection at the I.A.R.I.**—*Curr. Sci.*, xvi, 11, p. 350, 1947.

Founded in 1936, the fungus culture collection became an integral part of the Indian Agricultural Research Institute [*R.A.M.*, xxii, p. 216]. At present it comprises 700 cultures, of which 325 are pathogens and moulds. So far, little time has been available for research work on the maintenance of fungi, but a new method of sealing culture tubes [ibid., xxvi, p. 309] is stated to have been devised whereby the longevity of certain species is increased and the necessity for frequent subculturing consequently diminished.

Dickson (J. G.). **Diseases of field crops.**—xii+429 pp., 102 figs., New York and London, McGraw Hill Book Company, Inc., 1947, $4·50.

Following a very brief historical introduction to the science of plant pathology and a chapter on the physiological anatomy of plant groups in relation to disease, the author concisely summarizes the most important available information on the diseases of cereals (with a separate chapter for each genus), sugar-cane, and grasses, legumes (comprising lucerne and sweet clover (*Melilotus* spp.), clover, and soybean), fibres (cotton and flax), and tobacco in the United States. Each chapter is supplemented by a bibliography, but no attempt has been made to give a complete survey either of this field or of the subject-matter discussed. The aim has rather been to provide a convenient reference outline of current investigations on the

diseases of the selected groups of crops. In general, the aspects covered include the geographical distribution, symptoms, and primary causes of the various diseases, conditions favouring their development and dissemination, and palliative and control measures. Considerable emphasis has been placed on the morphology of the pathogens, as affording perhaps the most reliable diagnostic key, while physiologic specialization and the biotypes of the parasites are treated at some length as an aid alike to plant pathologists and plant-breeders. An appendix indexes the bacterial and fungal pathogens systematically.

Wilska (A.). **Spray inoculation of plates in the detection of antagonistic micro-organisms.**—*J. gen. Microbiol.*, 1, 3, pp. 368–369, 1 fig., 1947.

The author suggests the following method of detecting antagonistic micro-organisms. The potential antagonists are allowed to develop first on the agar plate and then a suspension of the test organism is sprayed over it by means of a simple atomizer, which is described. A beautifully even growth of bacteria results; in this way a test organism may be sprayed on to established plate cultures of other organisms without disturbance of the colonies already present. The technique is also convenient for distributing the suspension of soil or other material under test. It is also suitable for surface-seeding the agar for cylinder- or cup-plate assay.

Hodges (F. A.) & Wildman (J. D.). **A contact culture method for detecting molds on surfaces.**—*Science*, cvi, 2757, pp. 425–426, 1 fig., 1947.

A new mould detection method [cf. *R.A.M.*, xx, p. 205] has been used for culturing moulds from contaminated surfaces in food plants, and could also be utilized for detecting yeasts (using acid media) and bacteria. Filter-paper disks with a tab at either side are stained in a 0·5 per cent. methylene blue solution, washed in water, and sterilized in a Petri dish. A thin coating of sterile agar is added to hold the disk flat and another to cover the surface. In testing for moulds and yeasts the coated disk is removed aseptically and placed face down on the surface to be tested and replaced in the dish. Growth may be observed after 24 hours through a Greenough microscope, the colonies usually becoming distinct after 48 hours. The blue paper facilitates counting.

Hutchinson (W. G.). **The fouling of optical glass by microorganisms.**—Abs. in *J. Bact.*, liv, 1, pp. 45–46, 1947.

The fouling of glass surfaces in optical instruments [*R.A.M.*, xxvi, p. 71] in the tropics caused principally by *Penicillium* and *Aspergillus* spp., and also by *Sporotrichum* sp., *Stachybotrys atra*, *Monilia* [*Neurospora*] *crassa*, and *Bacillus* sp. can be prevented by hermetically sealing the instruments or by the use of *m*-cresyl acetate (cresatin). This fungicide gave complete protection of binoculars for over two years, while untreated instruments were fouled in three weeks.

Brian (P. W.), Curtis (P. J.), & Hemming (H. G.). **Glutinosin: a fungistatic metabolic product of the mould Metarrhizium glutinosum S. Pope.**—*Proc. roy. Soc.*, Ser. B, cxxxv, 878, pp. 106–132, 1947.

Culture media on which *Metarrhizium glutinosum* [*Myrothecium verrucaria* sensu Preston: cf. *R.A.M.*, xxvii, p. 84] has grown are highly toxic to other fungi because of the production of a fungistatic substance, glutinosin [ibid., xxv, p. 271]. The fungus grows well on synthetic media such as Czapek-Dox or Raulin-Thom, but better sporulation and slightly increased fungistatic activity are obtained by using crude glucose instead of pure dextrose. The addition of yeast extract, biotin, or aneurin to a pure dextrose medium gave similar results. Peptone and ammonium tartrate were very effective as nitrogen sources, and supplements of various organic

acids, in concentrations of 0·05 to 1 per cent., to an ammonium sulphate medium, greatly increased both growth and production of glutinosin. The product was isolated from culture filtrates in pure crystalline form. It is markedly specific in its anti-fungal action, inhibiting the germination of *Botrytis allii* spores at 0·8 μ gm. per ml. in Czapek-Dox, but *Trichoderma viride* is not inhibited by 50 μ gm. per ml. [cf. loc. cit.]. Growth of *Mucor mucedo*, *Byssochlamys fulva*, *Hydnum coralloides*, *Penicillium digitatum*, and *Phoma betae* on prune agar plus 5 μ gm. per ml. was completely inhibited.

Ehrlich (J.), Bartz (Q. R.), Smith (R. M.), Joslyn (D. A.), & Burkholder (P. R.). **Chloromycetin, a new antibiotic from a soil Actinomycete.**—*Science*, cvi, 2757, p. 417, 1947.

A new antibiotic, for which the name chloromycetin is proposed, has been isolated from a *Streptomyces* sp. in a soil sample collected near Caracas, Venezuela. It has shown pronounced anti-bacterial activity in broth dilution assays against several Gram-negative bacteria, is stable at room temperature in aqueous solutions over a wide pH range for over 24 hours, and remains unaffected by boiling for five hours in distilled water.

Milner (M.), Christensen (C. M.), & Geddes (W. F.). **Grain storage studies VI. Wheat respiration in relation to moisture content, mold growth, chemical deterioration, and heating.**—*Cereal Chem.*, xxiv, 3, pp. 182–199, 3 graphs, 1947.

Moulds were shown by Milner and Geddes to be the principal factor in the respiration, heating, and chemical deterioration of soy-beans stored at the moisture levels encountered in commercial practice [*R.A.M.*, xxvi, p. 409]. The investigations herein reported were concerned with the respiration and heating of Regent wheat at 30° C. [cf. ibid., xxvi, p. 239 and next abstract], using methods similar to those already described in connexion with soy-beans, except that in the present case the mould population of the grain was assayed quantitatively.

Moisture contents below about 14·5 per cent. (corresponding to a relative humidity of 74 to 75 per cent.) yielded low and constant respiratory rates over the 20-day period covered by the tests. During this time the seeds showed no significant increases in the incidence of fungal infection, nor did they undergo chemical or germinative deterioration. At moisture values beyond this critical zone the respiratory rates increased as time advanced, accompanied by a similar trend in mould growth, chemical deterioration of the seeds (as indicated by increases in fat acidity and reducing sugars), loss of germination, and rises in the moisture content of the wheat samples [cf. ibid., xxvii, p. 17].

Alternaria and *Helminthosporium* spp. were the predominant moulds causing internal infection of sound, dry, wheat seeds. However, with rising moisture values above the critical level, *Aspergillus glaucus*, *A. candidus*, *A. flavus*, and *Penicillium* sp. developed in that order [cf. ibid., xxvi, p. 409]. The extent of mould growth with time was directly related to the respiratory activity and amount of chemical and germinative deterioration of the samples.

Aeration rates yielding inter-seed carbon dioxide concentrations exceeding 7 per cent. were slightly inhibitory to the respiration of damp wheat, while above 12 per cent. the inhibition of the process was marked.

Temperature and respiratory increases in damp wheat samples were directly correlated with mould growth up to a range of 52° to 55°, at which the fungi are killed, respiration is inhibited, and heating ceases. At higher moisture levels (95 per cent. humidity), bacterial growth may cause heating up to the thermal death range for the species concerned of 68° to 70°. Under strictly controlled adiabatic conditions wheat may continue to heat spontaneously owing to non-biological oxidation.

[ILNER (M.), CHRISTENSEN (C. M.), & GEDDES (W. F.). **Grain storage studies. VII. Influence of certain mold inhibitors on respiration of moist Wheat.**—*Cereal Chem.*, xxiv, 6, pp. 507–517, 4 graphs, 1947.

In this further instalment of their studies at the Minnesota Agricultural Experiment Station on the factors affecting wheat respiration in storage [see preceding abstract], the writers report and discuss the results of tests on over 100 compounds for their efficiency as mould inhibitors. Only eight of these were considered to merit further extensive trials, which were performed on Regent seed stored with a moisture content of 20 per cent. On this basis the fungicides (used at a strength of 0·1 per cent.) were rated in the following order of decreasing value: 8-hydroxyquinoline sulphate, thiourea, *p*-aminobenzoic acid, sulphanilamide, benzene sulphonamide, 2-amino-thiazole, chloramine B, and calcium propionate [*R.A.M.*, xxi, p. 342]. Of the two most effective preparations, thiourea was only slightly toxic to seed stored with moisture contents below 24 per cent., but 8-hydroxyquinoline sulphate reduced germination by over 30 per cent.

Sound wheat stored at 30° C. with moisture contents above 16·1 per cent. was rapidly overgrown by moulds. The increase in respiration and decrease in viability of the seed with a rising moisture content was proportional to the increase in mould incidence. Wheat treated with 1 part of thiourea to 100 parts (by weight) of moist seed respired at a nearly constant rate over a ten-day period, with only a slight decrease in viability and a small increase of moulds up to a moisture content of 14·3 per cent., although both moulds and respiration had begun to increase at a moisture content of 21·3 per cent. At moisture contents from 26·9 to 35·5 per cent. the viability of the seed was reduced. The fat acidities of wheat treated with thiourea were markedly lower than those of the untreated after ten days' storage at 30°, especially at moisture contents above 17·9 per cent.; for instance, at 21·3, 30·3, and 35·5 per cent., the amounts (in mg.) of potassium hydroxide per 100 gm. seed (dry basis) for neutralization in the two series were 20·4 and 141·2, 55·9 and 131·4, and 58 and 265·2, respectively.

The respiration of dormant seed on which moulds were inhibited (but not eliminated) increased gradually with a rising moisture content until the processes involved in germination began to operate. The sharp increase in respiration of the seed at the so-called 'critical' moisture content is caused by the respiration of moulds on and in the seed.

BERK (S.). **The resistance of treated felt gasket materials to fungus attack.**—*Amer. Dyest. Reptr*, xxxvi, 19, pp. 541–543, 1 fig., 1947.

Of seven fungicides tested at the Frankford Naval Laboratory, Philadelphia, for their efficacy against mould (*Aspergillus niger*, *Chaetomium globosum*, and *Penicillium* sp.) growth on felts, 4 per cent. copper pentachlorophenate, 0·25 per cent. phenyl mercuric oleate, 2 per cent. ethyl mercuric pentachlorophenolate, and 10 per cent. zinc dimethyl dithiocarbamate afforded complete protection. Dihydroxydichlorodiphenol methane (1 and 1·5 per cent.) was equally effective in the case of 100 per cent. wool felts but only partially so in that of cotton-wool felt mixtures. Copper-8-hydroxyquinoline (2 per cent.), with or without a water-repellent, permitted only slight mould growth and is regarded as satisfactory in practice. The phenyl mercuric salt of oleyl-amido-ethane sulphonic acid was the least efficient of the preparations tested.

ROMANO (F. R.). **Spore-rain technique for mildew resistance testing.**—*Amer. Dyest. Reptr*, xxxvi, 23, pp. 651–653, 675, 2 diags., 1947.

The spore-rain textile mildew-resistance test method used at the Philadelphia Naval Base Test Laboratory, besides maintaining optimum temperature, humidity, and nutrient conditions, provides that the test specimen be the sole source of

organic matter and that all its surfaces be subjected to mildew attack. Furthermore, provision is made for the automatic reinoculation of the specimen with viable spores throughout the incubation period. In the experiments discussed in this paper a mixed inoculum was used, consisting of *Aspergillus niger*, *Penicillium fusco-glaucum*, *Trichoderma viride*, *A. clavatus*, *Chaetomium globosum*, *Myrothecium verrucaria*, and *Memnoniella echinata* [*R.A.M.*, xxvi, p. 502].

The following are unique features of the method. (1) Exposure of all surfaces of the test specimen and exclusion of extraneous organic matter is effected by the use of a corrugated porous clay support. (2) Exposure of all surfaces of the specimen to mildew attack is ensured by inoculation with spores suspended in a high-nitrogen solution prior to incubation, and by the use of the above-mentioned support, which guarantees aerobic conditions on the under as well as the upper side of the specimen. (3) Growth of moulds on agar suspended in the top portion of the Petri dish assembly supplies a rain of viable spores which reinoculate the specimen throughout the experimental period.

CORDON (T. C.). **Some observations concerning methods for testing the resistance of leather to the growth of fungi.**—*J. Amer. Leath. Chem. Ass.*, xlii, 6, pp. 302-312, 4 graphs, 1947.

The proposed American Leather Chemists' Association method for testing the resistance of leather to mould growth [*R.A.M.*, xxv, p. 409] is discussed and reasons are given for each step in the procedure. The advantages of the technique over various other methods devised for the same purpose are its duplication of the essential conditions of natural exposure and its simplicity, enabling it to be used with a minimum of laboratory equipment and mycological training.

FOSTER (J. W.). **Some introspections on mold metabolism.**—*Bact. Rev.*, xi, 3, pp. 167–188, 1947.

In this essay on mutability in moulds the author, after formulating a number of axioms on microbial metabolism, discusses the efficiency of cell synthesis of moulds in relation to natural environment, overflow and shunt metabolism, mechanisms and postulated intermediates, main pathways of carbohydrate metabolism in moulds, and the question of reserve storage materials. A bibliography of 15 titles is appended.

YARWOOD (C. E.). **Water loss from fungus cultures.**—*Amer. J. Bot.*, xxxiv, 9, pp. 514–520, 4 graphs, 1947.

Tests conducted in the Department of Plant Pathology of the University of California showed that water loss (at 22° to 26° C.) from potato dextrose agar plates inoculated with *Rhizopus nigricans* [*R. stolonifer*], *Botrytis cinerea*, *Aspergillus niger*, *Monilinia* [*Sclerotinia*] *fructicola*, *Thielaviopsis basicola*, and *S. sclerotiorum* was generally greater than from uninoculated ones when the plates were closed, but less when open. Cultures of *R. stolonifer* showed the greatest and most significant difference, the water loss being 16 per cent. higher than the control when closed and 20 per cent. less when open. A correlation exists between the amount of aerial mycelium and the increased water loss from closed plates. Cultures killed by carbon disulphide and formaldehyde lost water more rapidly than living cultures.

No marked differences in the rate of water loss were observed between uninoculated and inoculated tubes of potato dextrose agar closed with cotton plugs and sealed with cigarette paper [*R.A.M.*, xxvi, p. 22].

Apricot and plum fruits inoculated with *S. fructicola*, *S. laxa*, *B. cinerea*, *S. sclerotiorum*, or with *R. stolonifer* lost water more rapidly than uninfected fruit, the presence or absence of sporulation having apparently no effect.

Red kidney bean [*Phaseolus coccineus*] plants inoculated with powdery mildew (*Erysiphe polygoni*) lost water more rapidly at night and less rapidly during the day than healthy plants. The curves of the diurnal transpiration cycle of Bordeaux-sprayed uninfected and unsprayed diseased leaves were parallel, although the actual values were higher for the former, the water loss from mildewed, sprayed leaves representing approximately the sum of the separate effects for Bordeaux spray and mildew infection.

The initial water loss of drying, detached Pinto bean leaves with unopened uredosori of rust (*Uromyces phaseoli*) [*U. appendiculatus*] was initially about 70 per cent. of that of uninoculated twin leaves during the day, but the rate of loss soon doubled. The night transpiration of rusted turgid bean leaves was greater than that of healthy leaves both before and after the pustules opened. During the day the water loss from turgid rusted leaves was generally less than that of healthy before the pustules opened, but more afterwards.

The author tentatively concludes that the main factor causing increased water loss in fungus-infected tissues is the increased permeability of the host cells. There is relatively little water loss from the fungus tissue itself, or from mechanical openings made by the pathogen.

IMASSET (P.) & DE MONTGREMIER (HÉLÈNE A.). **Sur une méthode de dosage des virus des plantes.** [On a method of plant virus dosage.]—*C.R. Acad. Sci., Paris*, ccxxv, 23, pp. 1176–1177, 1947.

With slight modifications, Jermoljev and Hruska's (1939) serodiagnostic method for the determination of potato viruses has proved very useful in the writers' experiments with the tobacco mosaic and potato X and Y viruses, notably as an aid to accurate dosage. This method is similar to that employed by Stapp in Germany [*R.A.M.*, xxv, p. 356], Roland in Belgium [ibid., xxv, p. 250], and van Slogteren in Holland.

TELZNER (G.) & SCHWALB (H.). **Die Virusanfälligkeit von Solanum demissum Herkunften.** [The virus susceptibility of *Solanum demissum* derivatives.]—*Züchter*, xv, 10–12, pp. 187–190, 4 figs., 1943.

Of six derivatives of the wild potato, *Solanum demissum*, under observation at the Müncheberg (Mark) Plant Breeding Institute, three were selected for further intensive testing by rubbing and grafting for their reactions to potato viruses A, X, and Y [*R.A.M.*, xxv, p. 413]. *S. demissum* f. *xitlense* and *S. demissum* 'Bukasov' were severely attacked by A and very severely by Y but were only slightly susceptible to X. *S. demissum* 'Rio Frio' (W. 35) sustained the heaviest damage from X [see next abstract] and was also very susceptible to Y, while the effects of X were less injurious.

EMSROTH (H.). **Solanum demissum als Testpflanze.** [*Solanum demissum* as test plant.]—*Züchter*, xv, 10–12, pp. 190–192, 1943.

In experiments at a potato-breeding station at Ebstorf, near Uelzen [Hanover], *Solanum demissum* W35 proved superior to chilli and Samsun tobacco as a test plant for the diagnosis of the potato viruses A and X [see preceding abstract]. The symptoms developed more rapidly and were better defined in the wild potato than in the other two indicators.

ERREN (F.). **Neuere Fragen im Saatkartoffelbau.** [Current problems in seed Potato cultivation.]—*Schweiz. landw. Monatsh.*, xxv, 6, pp. 190–203, 1947.

Some valuable information is presented in this survey of Swiss potato-growers' problems, of which the foremost to-day is degeneration of virus origin [*R.A.M.*, xv, p. 133], predominantly expressed as leaf roll. The subject is discussed under

the following headings: (i) viruses are the cause of degeneration, (ii) the potato viruses, (iii) biology and distribution of the peach aphid, and (iv) means and methods of maintaining the crops in health.

The peach aphid (*Myzus persicae*) overwinters not only on perennial plants notably *Brassica* spp. [ibid., xvi, p. 551; xviii, p. 132, *et passim*], but also in cellars storehouses, clamps, and the like. Up till now the latter possibilities have not received the attention they actually deserve. P. Fenjves (Beiträge zur Kenntnis der Blattlaus *Myzus persicae* Sulz., Überträgerin der Blattrollkrankheit der Kartoffel [Contributions to the knowledge of the leaf aphid *Myzus persicae* Sulz., vector of the Potato leaf roll disease], Thesis, ETH [Federal Technical College], 1945), in a cursory examination of potato tubers just planted near Wädenswil, counted on an average eight aphids per tuber, resulting in the same season in an incidence of 95 per cent virus infection. The same worker states that a brief starting period, lasting in the central regions of the country until the end of June, is followed by a sudden intensive rise in aphid infestation of the crops, which reaches a climax about mid-August and then declines, tends to a renewed increase in the first half of September, and ceases altogether by the end of the month. Fenjves further noted that the aphids colonize healthy more than leaf roll plants [cf. *R.A.M.*, xxvi, p. 258]. Multiplication, however, takes place with equal rapidity on the latter, and the higher rate of migration from the infected plants increases the risk of contamination from this source. There is some evidence that certain varieties are more palatable than others to the peach aphid. For instance, in the summer of 1946, the author observed an uncommonly severe epidemic in a field of Bintje, whereas a Voran crop about 500 m. distant was barely touched. According to Fenjves, roughly 15 to 20 per cent. of all potatoes cultivated in Switzerland are virus-diseased, resulting in an estimated average yield reduction of 10 to 20 quintals [1 quintal = 100 kg.] per ha. In 1946, however, the incidence and losses were much higher.

Recognized measures are prescribed for the control of virus diseases. Great importance is attached to early harvesting and some data are cited to illustrate its advantages. Thus, the incidence of severe mosaic [potato virus Y] in class B Erdgold (average of three plots) harvested on 21st and 28th July and 2nd August 1946, was 6, 15·75, and 42 per cent., respectively, and the corresponding yields 439, 404, and 354 kg. per ha. In the Voran plots the percentages of virus Y on the same three dates were 2, 5, and 13 per cent. and the yields 504, 493, and 452 kg. respectively. When the figures for (*a*) early harvesting and (*b*) normal date were compared in respect of four other varieties, Bintje (*a*) showed 1 per cent. virus Y and yielded 312 kg. per ha., the corresponding figures for (*b*) being 5 and 288 respectively; Böhms A[llerfrüheste] G[elbe] (*a*) 13 per cent. and 352 kg. and (*b*) 18 and 348; Sabina (*a*) 3 per cent. and 316 and (*b*) 17 and 288; and Ackersegen (*a*) 2 per cent. and 316 and (*b*) 35 and 265. Further investigation is required to determine the correct dates for harvesting in different localities and under varying seasonal conditions, as well as the minimum period to be allowed for the crop to mature. In a test in 1946 a full crop was obtained from a stand of Ackersegen planted on 23rd April and harvested on 11th July. Scarcity of labour may complicate the early lifting of potatoes and if delayed the haulms should be destroyed with dinitrocresol, sodium chlorate, calcium cyanamide, or kainit [cf. ibid., xxvi, p. 561] to prevent the spread of infection to the tubers during the period of postponement.

Mai (W. F.). **Virus X in the newer Potato varieties and the transmission of this virus by the cutting knife.**—*Amer. Potato J.*, xxiv, 10, pp. 341–351, 1947.

In New York State mosaic symptoms have been observed on Chippewa, Katahdin, and Sebago potato varieties. As these varieties constitute a large percentage of the potatoes grown in this State and other areas of the United States a study was made of the virus responsible and its means of transmission in commercial

stocks. Inoculations from 55 mosaic plants of the Katahdin variety, 5 of Sebago, and 18 of Chippewa to healthy *Datura stramonium*, tomato, chilli, and tobacco plants established virus X [*R.A.M.*, xxiv, p. 113; xxvi, p. 413] as the responsible agent, variable mosaic symptoms, ranging from a very mild to a brilliant mottle with small necrotic spots in the chlorotic areas, comparable to those on the original potato plants being induced. Cleft grafts with scions from the 78 mosaic plants to 41956 and Arran Victory showed the absence of viruses A and Y, and B, respectively. When 12 X-free American potato varieties were graft-inoculated with Green Mountain scions containing viruses X and B and with Katahdin showing mild, medium, or severe types of virus X, the virus X was transmitted to approximately 95 per cent. of the plants. On mechanically inoculated plants the symptoms were similar to those present on the original mosaic plants from which the inoculum came. The symptoms produced by mechanical inoculation from Green Mountain plants were apparently unaltered by the presence of virus B. When healthy seed pieces were cut with a virus X-contaminated knife, approximately 10 per cent. became infected; a considerably higher percentage of transmission was obtained with severe than with the mild virus X type, reaching 50 per cent. in Sebago.

Black (W.). **Blight resistance in Potatoes.**—*J. Minist. Agric.*, liv, 5, pp. 198–200, 1947.

The work described in this paper on the distribution of strains A, B, and C of potato blight (*Phytophthora infestans*) in Scotland has already been described from another source [*R.A.M.*, xxvi, p. 506]. A potato variety bred from *Solanum demissum* and immune from strains A and C has been approved in official trials and named Craigs Bounty.

Reddick (D.) & Peterson (L. C.). **New blight-resistant varieties.**—*Amer. Potato J.*, xxiv, 10, pp. 319–336, 1947.

Notes are given on potato hybrids released for increase to growers as a result of extensive breeding for resistance to blight (*Phytophthora infestans*) [*R.A.M.*, xxvii, pp. 85, 88], at Cornell University, New York. Empire [ibid., xxv, p. 276] gave high yields in 1946 although it developed tuber rot and foliage blight late in the season. The new varieties Placid, Virgil, Ashworth, and Chenango have undergone fairly extensive field trials and under various conditions in which they were found to be wholly or practically blight-immune and adaptable over a fairly wide area. Placid, originating from a cross between *Solanum demissum* and *S. fendleri*, resembles Katahdin, but is susceptible to common scab [*Actinomyces scabies*] and leaf roll. Virgil is from the third back-cross stage from *S. pirola*×*S. demissum*, matures slightly later than Placid, and is susceptible to *A. scabies* and rugose mosaic [potato virus Y]. Ashworth, originating from *S. demissum*×*S. maglia*, matures slightly earlier than Placid and is superior to Katahdin in cooking quality. It is susceptible to leaf roll. Chenango, originating from *S. demissum*×*S. fendleri*, matures early, has fairly good cooking qualities, but is susceptible to leaf roll and to virus Y. Other varieties released for increase include Essex (DAB–3), Madison (DUY–2), and Snowdrift (DDD–10), all early maturing, Cortland (DFC–1), a main crop, and Fillmore (CRH–3) and Harford (CSF–11), both late.

Piard-Douchez (Yvonne). **Mode d'invasion des tubercules de Pomme de terre par le Spongospora subterranea (Wallr.) T. Johnson, agent de la gale poudreuse.** [Mode of invasion of Potato tubers by *Spongospora subterranea* (Wallr.) T. Johnson, agent of powdery scab.]—*C.R. Acad. Sci., Paris*, ccxxvi, 1, pp. 113–115, 3 figs., 1948.

The microscopic examination of the apparently normal portions of potato tubers infected by *Spongospora subterranea* [*R.A.M.*, xxii, p. 403] revealed the presence of myxamoebae both inter- and intracellularly. They do not persist in the

cork, but in the underlying conjunctive tissue with starch reserves they ar numerous. Within the cell they commonly occur along the walls, more rarel surrounding the nucleus. The host tissues do not react to this primary entry o the parasite either by hypertrophy or hyperplasia, except maybe for some mal formations of the nucleus when encircled by myxamoebae. Only when th myxamoebae fuse to form plasmodia does the surface of the tuber swell and th circular protuberances develop which Kunkel (*J. agric. Res.*, iv, p. 265, 1915 believed to represent the incipient stage of the disease. However, this intercellula plasmodium, which also occurred in the author's preparations, is merely a secondar phase resulting from a fusion of the pre-existing intercellular myxamoebae.

Eddins (A. H.) & Foster (A. A.). **Rhizoctonia and common scab on Chippew Potatoes in muck.**—*Plant Dis. Reptr*, xxxi, 10, pp. 376–377, 1947. [Mimeo graphed.]

A harvest inspection of potatoes growing in muck on 18th June, 1947, at Zellwoo Florida, revealed that about 10 acres of Chippewa had been ruined by *Rhizocton* [*Corticium*] *solani* and common scab (*Actinomyces scabies*) [*R.A.M.*, xxvii, p. 85 Adjoining Sebago rows planted two weeks earlier remained almost entirely fre from *C. solani*. It is suggested that weather and soil conditions most favourable t the development of the disease coincided with the most susceptible growth stag of Chippewa, but not with those of Sebago plants.

Broadfoot (Jane). **Preliminary experiments on the protection of cut sets of Potat from infection with Penicillium.**—*Emp. J. exp. Agric.*, xv, 60, pp. 227–236, 194

Heavy contamination of exported potato sets with *Penicillium* in 1942 led t this investigation at the Ministry of Food of measures for their protection. Singl eye cut sets of Kerr's Pink, Up-to-Date, Epicure, Doon Star, and Golden Wond were treated with thymol-peat (15 gm. to 85 gm. peat in a closed tin for two t three hrs. at 150° to 180° C. and then used as a light covering over the sets), or per cent. boric acid solution at 21°, or other fungicides. Laboratory tests show that untreated sets left in a moist atmosphere (6°) developed very little or n mould compared with those left to become air-dry, a good cork surface layer bein apparently a prerequisite. Suberization in a germinator (21° to 26°) under w conditions was markedly better than under dry in an incubator (20°) but subsequen protection from mould was better when suberization occurred in the latter. N mould developed in the untreated incubator sets, confirming the suggestion tha an adequate cork layer may make disinfection unnecessary. Fungicides did not giv complete control of mould in the absence of suberization.

In planting trials sets were cut in December, 1943 and planted on 30th Marc 1944. In Epicure the suberized sets showed much better growth and yields tha the non-suberized; the yield of the cut sets was much inferior to that of the who tubers. In Kerr's Pink all the non-suberized sets, whether treated or not, fail completely. The yields of suberized sets treated with zinc oxide powder [*R.A.M.* xxvii, p. 37], diphenyl-peat, ceresan, or thymol-peat, were equal to or better tha the untreated, thus indicating that the use of fungicides might be advantageo for producing higher yields.

The reported condition of sets after transport tends to conflict with the perfo mance of those kept behind as controls, and further study of this problem recommended.

Salzmann (R.). **Über die Bakterienringfäule der Kartoffeln.** [On the bacterial ri rot of Potatoes.]—*Schweiz. landw. Monatsh.*, xxv, 11, pp. 317–321, 1 fig., 194

The Swiss potato harvest in 1946 was insufficient to cover the country's requi ments, and some 2,800 tons were accordingly imported from the United States f

consumption only. It was suspected that the consignments would contain a certain number of tubers infected by ring rot (*Corynebacterium sepedonicum*), and a sample of 1,000 examined by the modified Gram-stain method recommended by the Potato Association of America [*R.A.M.*, xxiv, p. 246 and above, p. 118] actually yielded three. Since a number of growers, disregarding explicit instructions and their own guarantees, used the imported tubers for planting, outbreaks of the disease are to be feared. Ring rot is unfamiliar in Switzerland, where its occurrence hitherto has been purely sporadic, and the available information on its symptomatology, diagnosis, and modes of transmission is summarized as an aid to recognition.

Wager (H. G.). **Quality of Potatoes in relation to soil and season. Time of lifting and the colour of the cooked Potato.**—*J. agric. Sci.*, xxxvii, 4, pp. 270–274, 1947.

Continuing his studies on stem-end blackening of potatoes [*R.A.M.*, xxv, p. 317; xxvi, p. 507], the author carried out tests with King Edward, Majestic, and Doon Star samples obtained in 1943 and 1944 from various parts of eastern England. The results showed that potatoes lifted late in the season are more liable to stem-end blackening than those lifted early and that the incidence increases during storage at 8° C. Certain samples blackened more extensively if stored at low temperature immediately after lifting. Some potato samples, however, remained unaffected by the different treatments. It is concluded that while temperature has some influence on stem-end blackening, it increases or accelerates the production of pigments only in the presence of certain other unknown factors.

Koblet (R.). **Nichtparasitäre Knollenkrankheiten der Kartoffel.** [Non-parasitic Potato tuber diseases.]—Reprinted from *Schweiz. landw Z. 'Die Grüne'*, *1947*, 11 pp., 5 figs., 1947.

Among the non-parasitic diseases of potato tubers in Switzerland are 'Eisenfleckigkeit' [internal rust spot: *R.A.M.*, xxv, p. 520], hollow heart, and the complex of metabolic disturbances resulting in discoloration on cooking [see preceding abstract]. As already observed in other countries, internal rust spot is most prevalent on sandy soils. Of the leading commercial varieties at present under cultivation, Erdgold and Centifolia are particularly susceptible and Ackersegen moderately so, while Voran is highly resistant and Bintje quasi-immune.

Histological analyses of tubers affected by hollow heart, to which the Allerfrüheste Gelbe variety is specially prone, revealed an abnormally high water content in the discoloured areas, which were also richer in nitrogen compounds (predominantly non-albuminous) than the sound flesh.

The examination of a total of 125 samples of Voran and Ackersegen tubers from plots receiving (1) a complete fertilizer, (2), (3), and (4) complete fertilizer plus 30, 60, and 90 kg. calcium nitrate, respectively, disclosed in the former variety the following percentages of the various forms of melanism comprised under the names of black or grey spotting and black heart [ibid., xxi, p. 538] (1) 6·3, (2) 7·2, (3) 8·9, and (4) 8·9; and in the latter 2·5, 1·7, 2·5, and 3·1, respectively. In storage during the winter of 1945–6, discoloration in Voran rose from 6 to 9·6 and in Ackersegen from 1·7 to 3·2 per cent. between the autumn and spring inspections.

The promotion of blackening by bruising, dropping, and general rough handling of the tubers [ibid., ix, p. 53] was confirmed by an experiment in which two lots of Voran and one of Ackersegen were examined in July, 1946, immediately before and two days after removal of superfluous sprouts with and without special care. Even in the former case the percentage of intensive blackening rose from 1·5 to 27·5 in one lot of Voran, the corresponding figures for the other of the same variety and for Ackersegen being from 4 to 5·5 and 1 to 2·5, respectively. Handled without extra caution the percentages were 54·5 and 72 in the two lots of Voran and 17·5 in

Ackersegen. In another test 25 samples of the Voran lots included in the manurial experiment described above were thrown from a height of 65 cm. to a cement floor. The total percentage of blackspotted tubers following this treatment ranged from 50 to 100, and that of severe damage from 5 to 34·5. To some extent a high incidence of the disorder was correlated with the heavier applications of nitrogen in the fertilizer.

Chemical analyses indicated that tubers with a low potash and high nitrogen content tend to suffer particularly heavy damage from blackening, and growers are consequently advised to provide the crop with a sufficiency of the former element and to use the latter sparingly. The tubers should be carefully handled during harvesting and storage operations.

Tocchetto (A.). **Três novos fungos do Arroz no Rio Grande do Sul. Nota prévia.** [Three new fungi on Rice in Rio Grande do Sul. Preliminary note.]—*Rev. agron., Pôrto Alegre*, xi, 10, pp. 121–122, 2 figs., 1946.

During 1946 the writer observed three parasitic fungi on rice not hitherto recorded in the State of Rio Grande do Sul, Brazil, viz., *Rhizoctonia* [*Corticium solani* [*R.A.M.*, xx, pp. 127, 290, 423], *Pythium arrhenomanes* [cf. ibid., xi, p. 778], identified by J. B. Marchionatto and J. T. Middleton, respectively, and *Sclerotium oryzae* [ibid., xi, p. 599 *et passim*].

Singh (B. N.). **Studies on soil Acrasieae. II. The active life of species of Dictyostelium in soil and the influence thereon of soil moisture and bacterial food.**—*J. gen. Microbiol.*, i, 3, pp. 361–367, 1 pl., 1 graph, 1947.

Further studies on *Dictyostelium* spp. in arable soils [*R.A.M.*, xxvi, p. 512] showed that when spores of *D. mucoroides* or *D. giganteum* were added to sterile soil containing a pure culture of an edible bacterium, the resulting myxamoebae actively destroyed the bacteria in the soil. When spores of *D. mucoroides* were added to the centre of a Petri dish of sterilized soil containing bacterial food, no fruiting bodies developed at a moisture content of 15 per cent. or under. At 19 per cent., fruiting bodies formed in the centre only. At 33 per cent., the central area over which fruiting bodies appeared progressively enlarged until it occupied the entire soil surface. Species of *Dictyostelium* are also able to complete their life-cycle in fresh, unsterilized soil.

The nature of the bacterial food supply was also found to affect the growth of *D.* spp. in soil, as measured by fruiting body formation. Normal fructification occurred on soil containing bacterial strains which induced abnormal fructification on agar.

Fujimoto (C. K.) & Sherman (G. D.). **The effect of physical treatments on the fixation and release of manganese in Hawaiian soils.**—Abs. in *Proc. Hawaii. Acad. Sci.*, xxi, pp. 8–9, 1946.

Macadamia ternifolia nut trees growing within a strip of a hillside orchard in Hawaii were observed to be invariably chlorotic. The affected strip widened during the dry summer months and narrowed with heavier precipitation in the winter. Preliminary determinations showed that soil samples taken within the chlorotic band were uniformly higher in exchangeable manganese than those in the area of normal trees on either side. A very similar chlorotic condition also developed in plants grown on normal soils receiving excessively large soluble manganese amendments [cf. *R.A.M.*, xxv, p. 127 *et passim*].

In a study of the effects of various physical treatments on the release and fixation of manganese, a gradual increase in the exchangeable fraction of the element occurred when soils were air-dried. Oven-drying and steam sterilization raised the exchangeable manganese from a few parts to some 3,000 per million in a number

of soils. Wetting and drying appear from these experiments to play an important part in the release and fixation of manganese, its distribution in the soil being influenced not only by oxidation reduction relations but also by the processes of hydration and dehydration.

Stark (F. L.) & Lear (B.). **Miscellaneous greenhouse tests with various soil fumigants for the control of fungi and nematodes.**—*Phytopathology*, xxxvii, 10, pp. 698–711, 1947.

Most of the experiments with soil fumigants described in this paper were concerned with nematode control at Cornell University, New York, but a species of *Fusarium* causing damping-off of peas was included in one trial [cf. *R.A.M.*, xxvii, p. 23]. Chloropicrin (0·1 to 2 ml. per gal. crock of soil) was the most effective of the preparations used for the latter purpose, giving an average stand in three tests of 66 to 95 per cent. compared with 2 to 17·2 per cent. in the controls.

Sarojini (Miss T. S.) & Yogeswari (Miss L.). **Aeration affecting growth and sporulation of some soil Fusaria in liquid cultures.**—*Proc. Indian Acad. Sci.*, Sect. B, xxvi, 2, pp. 69–76, 6 graphs, 1947.

At the University of Madras the authors studied the effect of aseptic aeration on the growth and sporulation of *Fusarium vasinfectum*, *F. moniliforme* [*Gibberella fujikuroi*], and *F. udum*, isolated from root rots of cotton, rice, and pigeon pea [*R.A.M.*, xx, p. 496], respectively. Aeration was effected by connecting a series of Erlenmeyer flasks containing sterilized liquid cultures of the fungi to an air pump, the rate of air flow being adjusted at 660 ml. per minute and the incoming current rendered aseptic by passage through disinfectants in Woulff's flasks. The experiments were conducted at a temperature of 25° to 30° C.

The sporulation of the three species reached an optimum at 0·2 per cent. nitrate nitrogen in Horne and Mitter's standard liquid medium. Aeration promoted mycelial growth (on both dry and ash weight basis) but progressively inhibited sporulation (determined quantitatively). It exerted no direct effect on the pH of the culture medium.

Zogg (H.). **Zur Kenntnis pflanzlicher Abwehrreaktionen. Der Einfluss der Temperatur auf das Zustandekommen der gummösen Demarkationszone.** [Contribution to the knowledge of plant defence reactions. The influence of temperature on the development of the gummous demarcation zone.]—*Ber. schweiz. bot. Ges.*, lvi, pp. 507–522, 6 figs., 1 diag., 1 graph, 1946. [French summary.]

Continuing his studies on the reaction of opium poppies (*Papaver somniferum*) to infection by leaf blight (*Pyrenophora* [*Pleospora*] *calvescens*) in Switzerland [*R.A.M.*, xxvi, p. 126], the author found that the pathogen penetrates the foliar tissue and ramifies through the intercellular spaces. During this process toxins are released by the parasite enabling it to assimilate the requisite nutriment. At a temperature of 18° to 21° C. the host responds by the formation of a broad band of yellow-green cells, but at the optimum of 22° to 29° the growth of the fungus outstrips the diffusion of toxins and the waste products of the disorganized cells, so that the formation of the yellow-green zone is suppressed. Below 16° and above 30°, at which temperatures the daily increment in the diameter of *P. calvescens* does not exceed 0·32 mm., the host can react to infiltration by the formation of a gummous demarcation zone extending through 10 to 30 cell layers.

Jenkins (Anna E.). **Scab of Cinchona in South America caused by Elsinoe.**—*J. Wash. Acad. Sci.*, xxxv, 11, pp. 344–352, 3 figs., 1945. [Received November, 1947.]

The author's description of *Cinchona* scab (*Elsinoe cinchonae* n.sp.) and the diagnosis of the causal organism are based mainly on herbarium specimens placed

at her disposal by F. R. Fosberg and W. C. Davis, who collected them in the course of a botanical survey of Central and South America. The disease occurs practically throughout the range of *C. pubescens* in Colombia, i.e., comprising the three Cordilleras of the western half of the country, while a collection of the same host and one of *C. delessertiana* from Peru show identical symptoms. On the other hand *C. officinalis* appears to be infected only in two localities in the Department of Santander. Seedlings of the *succirubra* form of *C. pubescens* remained free from infection in the midst of diseased trees in a nursery in Cauca, Colombia, while wild plants and half a million nursery seedlings were also unaffected in Ecuador.

On the leaves the circular to subcircular, sometimes elliptical to oblong or irregular, raised spots, 1·5 or rarely up to 2 mm. in diameter, develop singly or in small groups and may coalesce; on the upper surface they are usually of a cinnamon drab colour, often encircled by a dark vinaceous-brown zone of varying width, and on the lower surface vinaceous-brown; the stem cankers, mostly sub-elliptical to elliptical, 4 to 5 mm. in diameter, occasionally fissured, are cinnamon-drab or concolorous with the stem; the lesions on the capsules are circular to elliptical or elongate up to 3 mm. or so in diameter, raised, short conical, or flattened, and wood-brown or concolorous with the healthy surface; the whole fruit may be variously deformed, often circular or crescent-shaped. The perithecia, pulvinate round to elliptical, up to 300 μ in diameter and 75 μ in thickness, are scattered over the lesions in the form of raised dark to black, punctate areas, and are densely packed with spherical to ellipsoid, thick-walled asci, 18 to 28 μ in diameter, containing hyaline, uni- to triseptate ascospores, 15 by 5 μ. The imperfect (*Sphaceloma*) state of the fungus, prominent on the foliar spots, consists of a more or less continuous layer of dark, cylindrical, frequently uniseptate conidiophores, 8 to 15 by 3·5 to 5 μ, tapering towards the apex, arising from a pale-coloured stroma, raised at the margin to form a sporodochium, up to 50 μ thick, sometimes tilted owing to the development of an underlying perithecium; the few conidia observed were brown, elliptical or spiculate at one end, 8 to 10 by 4 to 5 μ. The relationship of *E. cinchonae* to other members of the genus is discussed in the light of these studies.

No statement can yet be made regarding the actual or potential importance of *Cinchona* scab, but the involvement of the stems and young foliage points to the possibility of serious damage in the nursery under favourable conditions for the pathogen.

Evans (H.). **Research Botany.**—*Rep. Mauritius Sug. Cane Res. Sta., 1946*, pp. 25–56, 6 graphs, 4 maps, 1947.

In a large-scale experiment carried out in Mauritius in collaboration with P. O. Wiehe on the effect of pre-planting treatment of sugar-cane cuttings with organo-mercurial compounds [*R.A.M.*, xxvii, p. 45], in which aretan, ceresan, harvesan, agrosan G, verdasan, and abavit were compared with each other and with no treatment on M. 134/32, M. 171/30, M. 165/38, M. 63/39, and M. 76/39, with and without the application of 4 tons molasses per arpent [approximately 1 acre] applied ten days before planting, the number of shoots germinated after ten weeks was: untreated 2,004, ceresan 2,743, harvesan 2,690, aretan 2,207, abavit 2,839, agrosan 2,860, and verdasan 2,814. For the individual varieties the increase in the number of shoots over the controls was high with M. 171/30, M. 165/38, and M. 76/39, and much less with M. 134/32 and M. 63/39. The variety M. 171/30 is known to germinate poorly [ibid., xxvi, p. 126], while M. 134/32 germinates rapidly and well. Increase in the number of shoots germinated also resulted from the application of molasses, but only in the varieties which gave good response to the other treatments, i.e., M. 171/130, M. 165/38, and M. 76/39. In the plots treated with molasses the incidence of pineapple disease [*Ceratostomella paradoxa*: ibid., xxvii, p. 44] was significantly reduced.

On p. 12 of this report G. Mazery states that incidence of red rot [*Physalospora tucumanensis*: loc. cit.] on M. 134/32 during the season was almost unnoticeable. Chlorotic streak [loc. cit.] was present on M. 165/38, M. 63/39, and M. 76/39.

Saint (S. J.). **Twelfth Annual Report of the British West Indies Central Sugar Cane Breeding Station, Barbados, for the year ending September 30, 1945.**—45 pp. [? 1946. Received December, 1947.]

Section V of this report (pp. 31–34) is concerned with investigations on the sugar-cane mosaic [virus] disease [cf. *R.A.M.*, xxi, p. 161]. The utmost importance is attached to the development of a satisfactory technique for the artificial transmission of infection, and further experiments were carried out in an atmosphere of high humidity during and after inoculation, which had given promising results in the previous season. Twenty-four hours after being placed in the laboratory, 80 out of 100 B.H.10(12) plants were inoculated with the virus and the rest left to serve as controls; 20 inoculated and five control plants were removed to the normal atmosphere of the cistern immediately and similar sets after intervals of 24, 48, and 72 hours. Symptoms of the disease began to appear after a fortnight, and the final readings, taken at nine weeks, were as follows: of the 20 inoculated plants removed immediately after inoculation, 18 (90 per cent.) contracted infection, the corresponding figures for the batches of 20, 18 (two died), and 16 (four died) transferred after the lapse of 24, 48, and 72 hours being 20 (100), 16 (89), and 10 (63), respectively. None of the controls developed mosaic.

With a view to saving time and obviating the risk of fungal contamination in the plants transferred 72 hours after inoculation, a further 100 were divided into two lots, of which one (*a*) was maintained under conditions of high humidity for six and the other (*b*) for 12 hours before operations. Forty plants in each lot were then inoculated and removed in batches of 10 at intervals with the following results (in percentages after seven weeks): (*a*) 18, 24, 42, and 48 hours (one plant died in the last batch), 40, 90, 90, and 100, respectively; (*b*) 6, 24, 30, and 48 hours, 100, 90, 90, and 100, respectively. It would appear from these data that the maintenance of high humidity for 12 hours before and six after inoculation suffices to ensure the development of a reasonable incidence of infection.

In experiments performed to test the efficiency of D. C. Bain's method for the inoculation of sugar-cane seedlings with the aid of abrasives [ibid., xxiv, p. 121], it was found that none of the plants on which these were used contracted mosaic, whereas 80 per cent. of those inoculated with the needle had become diseased.

McMartin (A.).] **Experiment Station notes. Botanist's report.**—*S. Afr. Sug. J.*, xxxi, 9, p. 561, 1947.

Recent information from Portuguese East Africa and Rhodesia confirms the susceptibility to smut [*Ustilago scitaminea*] of the Co. 301 sugar-cane variety [*R.A.M.*, xvi, p. 512]; Co. 331 appears to be much more resistant.

None of the many unreleased varieties tested for their reaction to red rot [*Physalospora tucumanensis*] in the Eshowe district of Natal [ibid., xxiv, p. 165] proved to be nearly so susceptible as Co. 290 and P.O.J. 2725, while some, e.g., N:310 (now available to growers), promise to be much more prolific than the canes at present under cultivation.

The following preparations, used as cane dips [against *Ceratostomella paradoxa*: ibid., xxv, p. 321], significantly (*a*) raised the germination percentage (6 in the untreated lot) and (*b*) increased the weight of the shoots (44 gm. untreated): phygon (*a*) 62·6, (*b*) 678; aretan (*a*) 57·3, (*b*) 560; dowicide H (*a*) 55·3, (*b*) 570; cortosan D.P. at 0·06 and 0·12 per cent. (*a*) 54·6 and 52·6, (*b*) 416 (at 0·06 per cent.); cavit S (*a*) 50·6, (*b*) 604; R 1134 [L 1334 in the text]×14 at 1 per cent. (*a*) 48,

(*b*) 774; leytosan (*a*) 39·3, (*b*) 388; verdasan at 0·2 per cent. (*a*) 39·3, (*b*) 212; and agrosan GN (*a*) 39·3, (*b*) 532.

MAYOR (E.). **Notes mycologiques.—XII.** [Mycological notes—XII.]—*Bull. Soc. neuchâtel. Sci. nat.*, lxx, pp. 33–60, 1947.

The present instalment of the author's series of observations on the mycoflora of Neuchâtel [cf. *R.A.M.*, xxv, pp. 46–47; xxvi, p. 420] contains a number of new fungus and host records for Switzerland, including the following. *Sphaerotheca mors-uvae* was observed for the first time on black currant, *Erysiphe cichoracearum* on vegetable marrow, *E. martii* on lupin [ibid., xix, p. 657], *E. pisi* on field peas, vetch, *Vicia dasycarpa*, *V. pannonica*, and *V. villosa*, *Phyllactinia suffulta* on lilac [ibid., xxvi, p. 317], and *Uromyces pisi* on field peas.

The detection (jointly with Prof. Cruchet) of *Puccinia loliina* Syd. [*Ann. mycol. Berl.*, xix, p. 247] on *Lolium multiflorum* in the canton of Vaud in 1943 necessitated a revision of the author's herbarium specimens of the rust, which had been referred to *P. glumarum* in material of *L. peraenne* (Spain and Switzerland), *L. perenne* var. *genuinum*, *L. strictum* and its var. *genuinum*, *L. temulentum*, and *L.* sp. (Spain).

WALLACE (G. B.) & WALLACE (M[AUD] M.). **Second supplement to the revised list of plant diseases in Tanganyika Territory.**—*E. Afr. agric. J.*, xiii, 1, pp. 61–64, 1947.

This second supplement to the revised list of plant diseases in Tanganyika Territory [*R.A.M.*, xxiii, p. 501; xxiv, p. 442] includes *Cercospora canescens* [ibid., xxi, p. 360] on Bambarra groundnut (*Voandzeia subterranea*), *Colletotrichum truncatum* [ibid., xv, p. 272], *Synchytrium dolichi* [ibid., xvi, p. 1], *Cercospora canescens* and *Phomopsis phaseoli* [*Diaporthe phaseolorum*: ibid., xix, p. 643] on Lima bean (*Phaseolus lunatus*), *Ascochyta phaseolorum* [ibid., xxvi, pp. 276, 277] on soy-bean, *Gloeocercospora sorghi* [ibid., xxvi, p. 492: where *Ramulispora* was inserted in error] on *Pennisetum typhoides* and *P. purpureum*, *C. arachidicola* [ibid., xxv, pp. 333, 407, 536] on groundnut, *C. longissima* [ibid., xxiii, p. 428] on lettuce, *Septoria lactucae* [ibid., xxiv, p. 135] on the Celtuce lettuce, *C. mangiferae* [ibid., xxiii, p. 410, xxiv, p. 388] on mango, *C. fusimaculans*, *Helminthosporium* (?) *nodulosum* [ibid., xix, p. 258], and *Phyllachora eleusines* [ibid., ii, p. 264] on *Eleusine coracana*, *Oidium heveae* on rubber [ibid., xxii, p. 48], sooty stripe on sorghum (*Ramulispora sorghi*) [ibid., xxv, p. 392], *C. demetrioniana* [ibid., xxiii, p. 410] on sweet potato, *Peronospora destructor* [ibid., xxv, p. 96] on onion, and *Bremia lactucae* on sow thistle (*Sonchus oleraceus*) [cf. ibid., xxiv, p. 398].

WALLACE (G. B.) & WALLACE (MAUD M.). **Tanganyika Territory fungus list: recent records. IX.**—*Mycol. Circ. Dep. Agric. Tanganyika* 21, 6 pp., 194[illegible] [Mimeographed.]

New fungus records for Tanganyika Territory [see preceding abstract] listed in the first part of this circular include *Glomerella cingulata* (in the conidial state) on cacao pods infected by *Phytophthora palmivora* [*R.A.M.*, xii, p. 552], cotton leaf spot caused by *G. gossypii* (in the conidial state), *Phyllachora penniseti* on elephant grass [*Pennisetum purpureum*], *Eudarluca australis* parasitizing rust [*Puccinia* spp.] pustules on maize and sorghum leaves, *Ustilago avenae* on oats, *Helminthosporium sativum* on rye, broad bean rust (*Uromyces fabae*), anthracnose of the same host caused by a fungus indistinguishable from *Colletotrichum lindemuthianum* [ibid., xviii, p. 568] *Botrytis allii* on onion, *Podosphaera leucotricha* on apple, a destructive branch and stem canker of avocado associated with a fungus closely resembling the description of *Melanops perseae* [ibid., xvii, p. 432], *Armillaria mellea* on *Bougainvillaea*, and a nasturtium [*Tropaeolum majus*] leaf spot due to *Heterosporium* sp.

In the second part of the paper it is stated that the most destructive parasite observed in 1947 on French beans [*Phaseolus vulgaris*] was *Isariopsis griseola* [ibid., xxv, pp. 97, 539]. Maize streak [ibid., xxiv, p. 500; xxv, p. 154] was widely prevalent. Sorghum sooty stripe (*Ramularia sorghi*) [see preceding abstract] was found in every Province where the sorghum fields were examined.

Ling (L.). **Host index of the parasitic fungi of Szechwan, China.**—*Plant Dis. Reptr, Suppl.* 173, 38 pp., 1948. [Mimeographed.]

The present amplified and revised host index of the parasitic fungi of Szechwan [cf. *R.A.M.*, xxii, pp. 327, 456] embodies additional collections and corrections in determinations made since the publication of a preliminary list with the same title in 1942 (*Nanking J.*, xi, pp. 117–142).

Wei (C. T.). **Two new fungi from Szechuan.**—*Bot. Bull. Acad. sinica*, i, 3, pp. 209–212, 3 figs., 1947.

Of the two fungi described *Gymnosporangium tsingchenensis* n.sp. was collected (in the perfect state only) on *Cupressus funebris* at an altitude of 2,000 ft. above sea-level 40 miles north-west of Chengtu, Szechuan, in 1939 and 1942. The rust produced on branches of all ages and on trunks up to 100 years old gelatinous, reddish masses, which were also found on the stone steps of the mountain paths, simulating blood stains. The horns of the teleutosori, measuring 0·6 mm. to several cm. in length, 0·5 to 1·5 mm. in width, and 0·4 to 1 mm. in height, with rounded apices, are flame-scarlet on emergence, shading into orange-rufous to Sanford's brown, and becoming tremelloid and orange-chrome with orange-rufous apex on exposure to moisture. The subglobose, ellipsoid to oblong, unicellular, buckthorn-brown teleutospores measure 34·6 to 59·4 by 24·7 to 31·3 μ and are furnished with filiform pedicels, three to five times the diameter of the spore and 5 to 10 μ in diameter. The straight or curved, triseptate germ-tubes measure 62·7 to 92·4 by 14·5 to 19·8 μ, the sterigmata 16·5 to 29·7 by 10 to 13·2 μ, and the ellipsoid or ovate to broadly ovate sporidia 19·8 to 27·1 by 11·2 to 21·8 μ.

Drechsler (C.). **A Basidiobolus producing elongated secondary conidia with adhesive beaks.**—*Bull. Torrey bot. Cl.*, lxxiv, 5, pp. 403–413, 22 figs., 1947.

A full description is given of a fungus isolated from deciduous leaf mould near Mercer, Wisconsin, with secondary conidia possessing an adhesive beak, strongly suggesting a parasitic or, possibly, a predaceous relationship. The organism is named *Basidiobolus haptosporus* n.sp.

Thomas (K. M.), Ramakrishnan (T. S.), Soumini (C. K.), & Balakrishnan (M. S.). **Studies in the genus Phytophthora. I. Oospore formation and taxonomy of Phytophthora palmivora Butler.**—*Proc. Indian Acad. Sci.*, Sect. B, xxvi, 4, pp. 147–163, 2 pl., 6 figs., 1947.

A tabulated account is given of studies at the Agricultural Research Institute, Coimbatore, Madras, on oospore formation in paired cultures of 25 isolates of *Phytophthora* [*R.A.M.*, xxi, p. 165], mostly originating in the Province. They were found to fall into two main groups, the 'plus' and the 'minus' or 'male' and 'female' [cf. ibid., ix, p. 684; xi, p. 205; xix, p. 518, *et passim*], the former being represented by the isolates from areca palm (Nilekani), betel vine [*Piper betle*], *Citrus* I, *Clerodendron infortunatum*, *Colocasia antiquorum*, jak tree (*Artocarpus integrifolia*), [*A. integer*], and tomato, and the latter by those from areca palm (Tyagali), Palmyra palm (*Borassus flabellifer*), coco-nut, cacao, *Hevea* rubber, breadfruit (*A. incisa*), *Spondias mangifera*, *Agave wightii*, tobacco, *Citrus* II, and *Jatropha curcas*. Some of the isolates, e.g., those from areca (Nilekani) and *S. mangifera*, were found to

lose their sexual capacity with protracted culture (two years) on agar media. Fresh isolates produce oospores rapidly (in three to eight days) with complementary strains.

The mean diameter of the oospores found in these experiments fell within the limits reported by other workers, i.e., 17·5 to 24·4 μ. The wide variation confirms the great instability of this character and its consequent unreliability as a taxonomic criterion. All the isolates are considered to belong to *Phytophthora palmivora*, in which the morphologically similar and sexually compatible *P. arecae*, *P. meadii*, *P. faberi*, and *P. parasitica* var. *nicotianae* should be merged. *P. palmivora* is said to be heterothallic, but homothallism is reported to have been observed in some isolates.

Malkiel (S.) & Stanley (W. M.). **Immunochemical studies on Tobacco mosaic virus. I. The reaction with homologous rabbit serum.**—*J. Immunol.*, lvii, 1, pp. 31–42, 2 figs., 6 graphs, 1947.

The tobacco mosaic virus has been found to react as a single component in immunological systems [*R.A.M.*, xx, p. 316]. Increasing amounts of antigen added to a constant volume of immune rabbit serum produce increasing amounts of precipitate, which pass through a maximum in the region of antigen excess. In general, the maximum amount of antibody precipitates in the region of the equivalence zone, where the ratio of antibody to antigen is variable but has a mean of about 0·25, indicating that some 60 molecules of antibody combine with each virus particle in the complex. The relationship between *R*, the ratio of antibody to antigen, and the amount of antigen precipitated is markedly curvilinear, in which respect it appears to be typical of virus-antivirus systems. Electron micrographs of the reaction product between the tobacco mosaic virus and its homologous antibody show a 'lattice' effect, with each virus particle being separated from others by a definite, constant space, presumably the length of the antibody molecule.

Statutory rules and orders, 1947, No. 2479. Destructive Insect and Pest Acts, England. The Progressive Verticillium Wilt of Hops Order, 1947. Dated November 18, 1947.—2 pp., 1947. 1*d*.

As from 1st January, 1948, the occupier or other person in charge of any land in England or Wales on which progressive *Verticillium* wilt of hops (*V. albo-atrum*) [*R.A.M.*, xxvi, p. 468] exists or is suspected to exist, shall forthwith give notice in writing to the Ministry of Agriculture or one of its duly qualified inspectors, of the existence, or suspected existence, of the disease. From time to time, or as may be required by an inspector, all dead and dying bines and leaves of hop plants on land infested by the wilt organism shall be destroyed by fire on the premises. No hop plants or parts thereof grown on land infested at any time by *V. albo-atrum* may be sold for planting except under licence from the Ministry of Agriculture. Any person failing to comply with or contravening the provisions of this Order shall be liable to a fine not exceeding £10 for the first and not exceeding £50 for a second or subsequent offence.

P[arham] (B. E. V.). **Importation of Roses from New Zealand.**—*Agric. J. Fiji*, xviii, 2, pp. 56–57, 1947.

The Director of Agriculture, Fiji, has approved the removal of the restriction on the importation of rose plants from New Zealand into Fiji, formerly imposed because of the assumed risk of introducing fireblight [*Erwinia amylovora*: cf. *R.A.M.*, xiv, p. 702; xix, p. 256; xxv, p. 240]. Importers are required to obtain a permit, and to secure a plant health certificate from the New Zealand Department of Agriculture.